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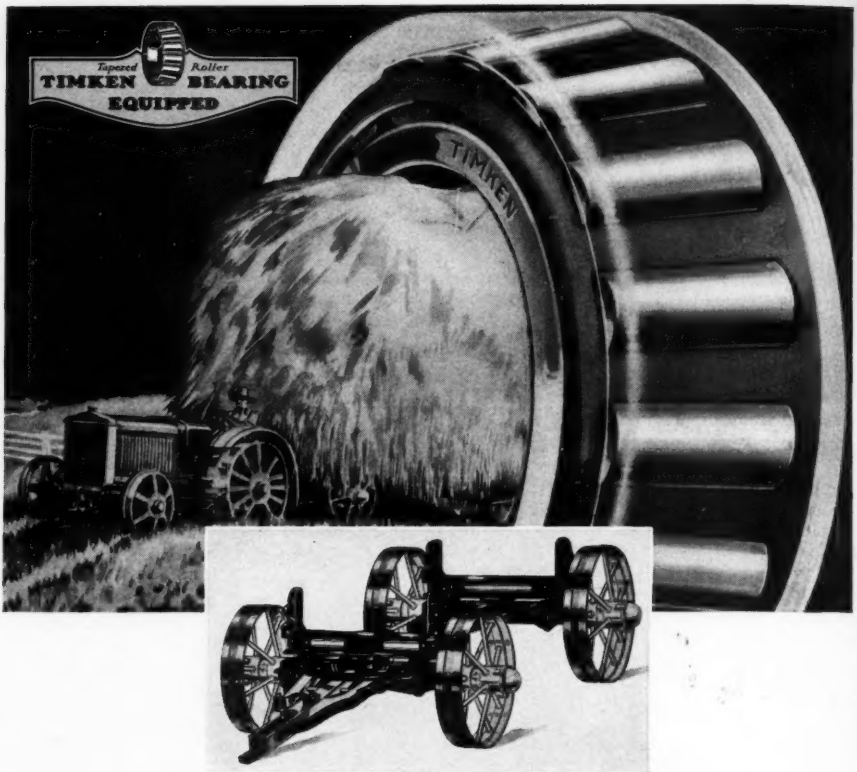

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TABLE OF CONTENTS, SEPTEMBER, 1931

Barkers and Builders, *Discussed by Jeff* 3

Better Pastures for Western Washington 5
Are Becoming Necessary, According to M. S. Grunder

Marketing Quality Vegetables 11
M. D. Butler Gives Some Instances

A Fallacy Uncovered 12
Kope Elias Tells How It Occurred

The Inquiring Mind and the Seeing Eye 14

Fertility and the Black Spot of Roses 17
A Disease Control Story, by C. T. Gregory

Potash Needs on Illinois "Alkali" Soils 18
A Fertility Story, by Jerome J. Henry

Kainit Kills Moss 21
An Experiment Described by T. H. Blow

High-yielding Ears 22
A Story of Corn Ear Selection, by E. N. Bressman

Cranberries, *By W. H. Ebling* 23

More Food for Potatoes 25
A Fertilizer Story, by R. F. Thomas

Winter Weed Hosts 26
Clean-up in the Fall, says O. C. Lee

A City Man's Alfalfa 28
The Story of a Man Who Made Good on a Farm, by G. C. Dunn

Liming Costs and Benefits 29
Discussed by M. A. Crosby

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By Ewing Galloway, N. Y.

MANY FARM BOYS WILL CROSS THE THRESHOLDS TO HIGHER EDUCATION THIS FALL.

Better Crops with Plant Food

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BARKERS and Builders

Have we room for both?

By Jeff McDermid

HAS the age of the big front, the raucous voice, and the glittering stick-pin come to a temporary halt in the management of the American side-show of marvels?

With the 1929 census of retail sales showing that 52 billion dollars was spent by the public, which was a little better than the national earners' income that year; and with the wild stock market gamble pretty well abandoned, perhaps the sentence we have received to spend a few terms in the economic house of correction may give some encouragement to the quiet and unobtrusive ones.

Foster and Catchings, twin necromancers of economics and socialism, are apparently imbued with the idea that what we need is more new appetites for more things for more jobs for more cash for more goods to make more jobs. To them the super-salesman and all the barker clan of the

erstwhile side-show are indispensable elements, like the auto, the radio, and the oil burner—things to which we and our children are meshed and geared forever in the never-ending search for greater creature comforts. To them the only way to get over the sudden gap in the highway of progress in front of us is to step on the gas and jump it. Why bother to detour or build a bridge?

NOW as a matter of sound fact, there are quite some considerable number of us representative American folks who have sort of managed to get along without golf pants, cigar lighters in our Fords, electric clocks, and Fuller brushes. Some of us have bred and reared youngsters who do not scan the pages of the Thursday Torment to find bizarre birthday gifts.

We have found that sound health is largely dependent upon simple lives and larders, and that "nerves" are unstrung and the mind unbalanced by too much yearning and posing. We enjoy seeing the links alive with those who would seldom get grass stains on their pants otherwise, and we let the ones alone who want to imitate Hollywood as the motion picture magazines picture it.

We still use the seats of our breeches or the soles of our shoes to scratch matches and we don't have to have a row of seventeen different brushes to use from rug-beating to tooth-cleaning. We still wind the eight-day clock, push the same old lawn-mower, and shovel in the fuel, all with humble thanks for so much time, such luxuriant grass, and credit from the coal man.

And by the way, if you were to carefully inquire of those who thus eschew the vainglories of super-salesmanship, I am sure that you would find real substance to them; that many of these quiet folks are enrolled in Who's Who, have been achievers in their lines and builders of the future. I am also confident that much of this raucous racket, which I liken to the side-show front, appeals to the hasty-minded, the tyros, and the inexperienced—the folks with come-easy, go-easy attributes.

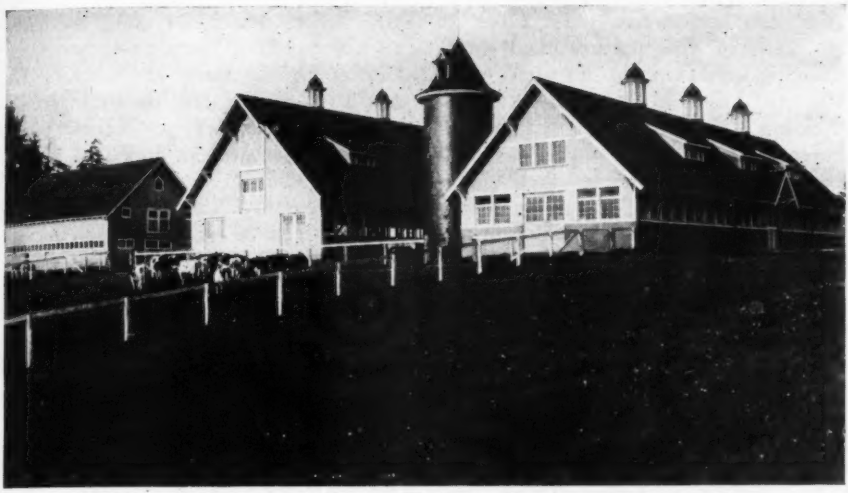
Neither do I admit that failure to respond to everything that is new and ultra-modern spells decadence or ignorance. Some of the world's wisest men at present are residents of the Orient, wrapped in simplicity and utterly indifferent to the poo-bah panorama. We are so apt, you know, to conflict the meaning of civilization with whatever goods or services we happen to sell.

Personally, I admit that the seller is a vital force in all life. Even the good old gospels had to be sold by a group of traveling men who paid their own expenses—divine drummers who went from East to West and back again through the mighty pages of sacred history. America was settled by many such people, who were a trifle impatient that the redskins did not listen freely to their fervid soul salesmanship. Resistance to sales ideas of this kind has been the goad that lashed all devotees into a fury of purpose, whatever their line might be.

I AM also aware that salesmanship transformed the back-breaking lot of the farmer into the comparative ease that he now enjoys riding the rows behind motive power. But it did not stop there, and all kinds of bunco artists broke down the fences legitimately sold by honest firms to safeguard the premises, and toured the rural routes with ointment and oil. Ask any implement dealer or machinery manufacturer now what the net result of over-selling farmers has been with near non-essentials, and your ears will be filled with brimstone.

Sales and profits supplanted the ideas of good will and confidence so much in American life during the past two decades that we got into the Barnum frame of mind as a public naturally must—namely, that if it is good and

(*Turn to page* 61)



The dairy equipment at the Western Washington Experiment Station is modern.

BETTER PASTURES *for* Western Washington

By Maynard S. Grunder

Agronomist, Western Washington Experiment Station, Puyallup, Washington

THE profitable operation of the dairy farm depends to a great extent upon low cost of production. Since the cost of production is largely dependent upon feed costs, any factor which will lower the cost of feeding will directly influence profit.

Inasmuch as good pastures produce a high yield of valuable forage at a very low cost, they form one of the most effective means of lowering the cost of producing dairy or livestock products. Hence, any knowledge which will enable the farmer to increase the yield, lengthen the productive season, or manage his pastures more efficiently, will be of great value.

Western Washington is very fortunate in having a climate which is particularly well adapted to the growing of pasture crops. The mild winter temperatures and abundant rainfall over most of the year encourage a long growing season and a heavy yield of forage. As a result the farmer may by proper management produce enough pasture to maintain his animals over a large part of the year. These factors, coupled with the nearness to large centers of population which provide a ready market, make this section of the country well suited to the dairy industry.

Of the 1,880,000 acres included in farms in western Washington at the present time, approximately one-half

is classed as pasture land. Over 80 per cent of this pasture land, however, is unimproved. In most cases the pasture consists mainly of low-yielding, native grasses which are forced to grow in competition with brush and ferns. Under such conditions, the carrying capacity of the pasture is naturally very low, varying from 60 to 100 cow-days per acre. On improved pastures the carrying capacity is of course much higher, ranging from 150 to 400 or even more cow-days per acre, depending upon the fertility of the soil, the moisture supply, and the kind of pasture.

A Long Grazing Season

On the improved valley lands, a grazing season of seven to eight months is not uncommon. Pasturing is often started early in March and may continue until late in October. Pastures remain green throughout the winter and although the rate of growth is very slow at this time, the material which accumulates during these months provides an abundance of feed for early spring pasturage. On the upland soils, moisture is the chief limiting factor, and the grazing season is generally over by mid-summer.

A common mistake among dairy farmers is that they utilize their best land for cultivated crops, cereal or hay production, and pasture their cows on what is left. As a result their pastures are used up early in the season, and they are forced to resort to barn feeding—a very expensive practice. It would be a much wiser practice to use the best land for pasture and the poorer land for crop production. This would result in far less barn feeding, lower labor costs, and would keep the animals in better condition. Even if smaller crops were produced, less supplementary feed would be required to carry the animals through the season when no pasture is available.

Although the percentage of improved land used as pasture in western Washington is small at the present time, there is an increasing tendency to use this land for grazing purposes. Census reports show that during the last five years there has been an increase of over 35 per cent in the amount of improved land used as pasture. Since it is only on the improved pastures that a high carrying capacity can be secured, this tendency should be encouraged.

The feeding value of a good pasture, properly utilized, is much higher than is ordinarily supposed. It has been aptly said that closely grazed pasture grass more nearly resembles a watered concentrate than a roughage. The research work of various experiment stations has demonstrated that this is true. Agricultural workers have found, in the dry matter of immature pasture grasses, a protein content much higher than that usually found in good alfalfa hay. For comparison, it may be said that Henry & Morrison's "Feeds and Feeding" shows that the average protein content of alfalfa hay is 14.9 per cent while that of wheat bran is 16.0 per cent.

Unpublished data of the Western Washington Experiment Station show that the dry matter of an unfertilized pasture mixture, kept in an immature condition by bi-weekly cuttings, averaged from May through December, more than 25 per cent crude protein. Incidentally, the yield of dry matter per acre secured during this time totaled more than 6,500 pounds. Besides a high protein content and a heavy yield, English investigators found that the dry matter of fresh pasture grass possessed a very high coefficient of digestibility.

Immature Grass Is Best

It is, however, a known fact that the feeding value of grass diminishes rapidly as it approaches maturity. Hence, it is evident that the pasture crop, in order to maintain its high feeding value, must be kept in an immature condition. One of the most effective means of keeping pastures in a succulent, immature condition is

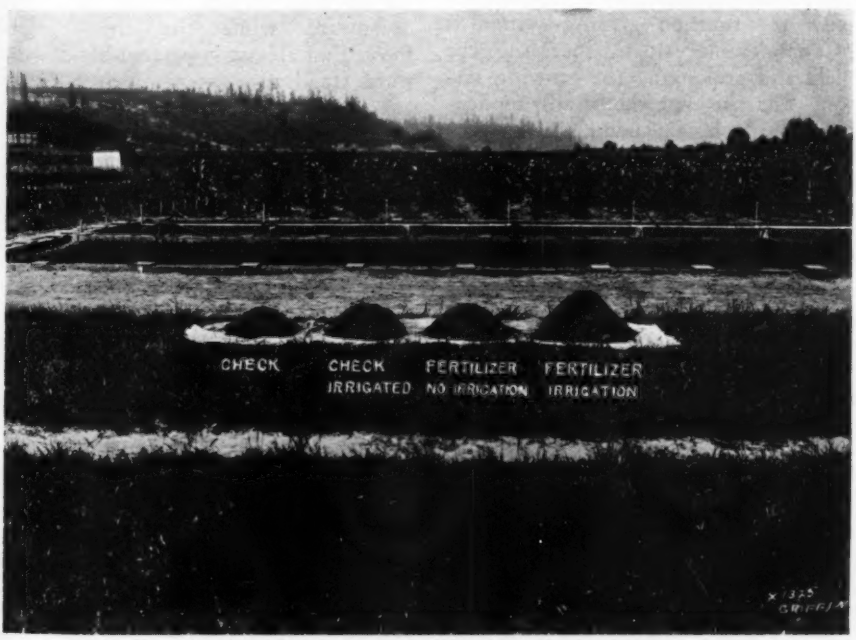
the system of pasture utilization known as rotation grazing. This system of pasture management originated in Germany as part of the Hohenheim System. The Hohenheim System involves the division of the pasture into a number of smaller units; the intensive fertilization of these units, especially with nitrogenous fertilizers; and the division of the herd for grazing purposes, into three groups, the high producers, the low producers, and the dry and young stock.

Each pasture unit is grazed first by the high producers, then by the low producers, and finally by the dry stock. Thus the high producers are always on the freshest grass while the residue is cleaned up by the other two groups. After the removal of the dry stock, each unit is allowed a period of recovery in preparation for the next grazing period. The basic principle in rotation grazing involves the intensive and thorough grazing of a pasture unit, followed by a period of rest during which the unit is not grazed.

The results obtained under the Hohenheim System of pasture management have been so outstanding that this system has been introduced, in modified form, into various parts of the United States.

Under western Washington conditions the division of the herd into three groups is not considered practical for the small dairyman. Two groups, however, consisting of the milkers and the dry stock, may be used very satisfactorily. The dry stock needs to be handled only when it is being moved from one plot to the next.

The size and number of units to be used in any rotation grazing sys-



FERTILIZER AND IRRIGATION PLOTS ON PASTURE

The figures are for cuttings taken on June 12 and represent about two weeks' growth of grass during an exceptionally dry period of weather.

Plot without water and fertilizer	368	lbs.	dry matter
Plot watered but not fertilized	594	"	"
Plot fertilized but without water	589	"	"
Plot watered and fertilized	848	"	"

tem depend upon the size of the herd and the amount of pasture available. The Western Washington Experiment Station recommends the division of the pasture into units of such size that the rate of grazing will be from 10 to 12 cows per acre. For example, a herd of 50 cows would suggest units of 4 to 5 acres. The heavy grazing of small units for short periods enables the dairyman to closely control the grazing of his pastures. Animals are kept on one unit until the pasture is closely grazed, at which time they are moved into the next unit. One of the advantages of this system is that little mature grass remains on the pasture after the grazing period. The pasture is thus left in a condition to produce a growth of fresh, palatable grass of high feeding value.

Fertilized Pastures Pay

The use of fertilizer in connection with the rotation grazing system is of considerable value in increasing the yield and prolonging the growing season. For this purpose a fall application of 300 to 500 pounds of a 2-10-10 complete fertilizer and a spring application of 300 pounds of nitrate of soda per acre, or its equivalent, are recommended. The nitrate of soda may be applied in two lots of 150 pounds each, although an early application of 100 pounds followed by a later application of 200 pounds is very satisfactory.

Liquid manure, when available, is a highly desirable pasture fertilizer and may replace a large part of the commercial fertilizer otherwise necessary. Liquid manure, while rich in nitrogen and potash, is low in phosphorus. For this reason some superphosphate or other form of phosphate fertilizer should be used to reinforce liquid manure.

In addition to increasing the yield and palatability of the pasture crop, there is a possibility that the use of fertilizer may be of practical value in preventing some of the mineral deficiencies of livestock. This possibility is suggested by the fact that the calcium and phosphorus content of the pasture crop may be increased by the use of fertilizer, especially when these elements are deficient in the soil.

The Western Washington Experiment Station has for a number of years been engaged in experimental work dealing with various phases of the pasture problem. As early as 1923, a project was started to compare various cultural treatments on established pasture. This experiment, which was carried on for seven years, showed very effectively that an annual scarification and reseeding on an established sod was not effective in improving the pasture. In fact the average carrying capacity of the scarified pasture was 5.5 per cent lower than that of the check plot. Furthermore, the trend of production of the scarified area (as plotted by the method of least squares) was decidedly downward while the check plot showed an almost imperceptible downward trend.

In order to determine the yielding ability of various grasses, and the rate of growth of different seasons of the year, duplicate series of grasses were seeded in 1/100-acre plots on a sandy loam bottom land soil early in March, 1930. One series of plots received before seeding, an application of fertilizer consisting of 300 pounds of nitrate of soda, 500 pounds superphosphate, 200 pounds muriate of potash and 2,000 pounds hydrated lime per acre. The other series received no fertilizer treatment. Cuts taken at bi-weekly intervals from the middle of May up to the end of October gave the following total yields of dry matter.

	Fertilized	*Unfertilized*
Italian Rye ...	7582	5827
Bottom Land Mixture	7343	6328
Ladino Clover .	7298	6955
Orchard Grass.	5281	4434
White Clover..	6649	5355
Meadow Fescue.	5380	4132

These dairy cows are grazing on a 1-acre plot fertilized with 500 lbs. 2-10-10 complete fertilizer and 300 lbs. nitrate of soda per acre. Up to July 15, the yield of pasture dry matter per acre on this plot was 7,058.3 lbs. as compared with 5,243.3 lbs. on the plot without fertilizer.

The highest yields were secured during May and June followed by a constant drop in the rate of production as the season advanced. For example, the monthly production of dry matter per acre of unfertilized Italian Rye grass was as follows:

June	1692	pounds
July	1421	"
August	847	"
September	495	"
October	320	"

This rapid decrease in the rate of growth during the summer and early fall is due to a large extent to the low rainfall during these months. Rainfall records for the past five years (1926-1930) show an average of .82 inches for June; .13 inches for July; .59 inches for August; and 1.33 inches for September.

The experiment above, showing the great drop in production as the season advanced, led the Experiment Station to inaugurate this year an experiment to determine the extent to which supplementary irrigation, aided by fertilization, would maintain a high production through the summer and fall months. While this work is still in its early stages, the data secured so far indicate that the application of water and fertilizer during the summer months will be of great value in lowering the cost of summer feeding. As a matter of fact, a few progressive farmers are already turning to irrigation as an economical means of increasing summer pasture yields. The abundance of water and cheap power available make this practice a very effective means of lowering production costs.

Some of the earlier work of the Western Washington Experiment Station was that of formulating suitable mixtures for various types of locations. Observations have shown that the best results have been secured from mixtures containing some of the tall bunch grasses, some clover, and some low-growing, sod-forming grasses. Such a mixture is palatable

and nutritious; covers the ground to the best advantage; withstands trampling well; and produces a heavy yield of forage over a long period. Based on their performance under our conditions, various grasses and clovers were selected to make up the mixtures to be recommended by the Western Washington Experiment Station. Various changes in the original recommendations have been found advisable, but the same principle is still being followed. At the present time the following pasture mixtures and grasses are recommended by the Western Washington Experiment Station:

For Rich Moist Bottom Land Soils

Italian Rye Grass	3 lbs.
English Rye Grass	3 "
Meadow Fescue	4 "
Orchard Grass	4 "
Creeping Bent	2 "
White Clover	4 "
Red Clover	2 "
Alsike Clover	1 "
For one acre	23 "

For Sandy Bottom Land Soils; Inclined To Be Droughty

Italian Rye Grass	3 lbs.
English Rye Grass	2 "
Tall Meadow Oat Grass	4 "
Orchard Grass	4 "
Kentucky Bluegrass	4 "
White Clover	4 "
Red Clover	2 "
Alsike Clover	1 "
For one acre	24 "

For Upland Clay Loam or Sandy Loam Soils

Italian Rye Grass	4 lbs.
Tall Meadow Oat Grass	5 "
Orchard Grass	3 "
Kentucky Bluegrass	2 "
Meadow Fescue	2 "
White Clover	3 "
Red Clover	2 "
Alsike Clover	2 "
For one acre	23 "

Reed Canary Grass (*Phalaris arundinaceae*) is recommended for land which is flooded for a considerable period during the winter. Because of its ability to thrive under conditions of excessive moisture, Reed Canary Grass has been instrumental in bringing into production hundreds of acres of otherwise worthless land. Its high yielding ability and long productive season make this grass a most valuable addition to the pasture crops of the dairyman of the Northwestern States.

Annual Fertilizer Applications?

In the fall of 1929 a grazing experiment was started to determine the extent to which the carrying capacity of a pasture might be increased by the annual application of a complete fertilizer. The area selected for this purpose consisted of three acres of an old bluegrass sod located on a rather droughty sandy loam soil. This area was divided into three one-acre plots, two of which were fertilized while the third received no fertilizer. The fertilizer program included a fall application of a 2-10-10 complete fertilizer and two spring applications of nitrate of soda, the two nitrate applications totaling 300 pounds.

An average of 176 ten-hour grazing days per acre was secured the first season from the fertilized plots as compared to 139.5 for the unfertilized plot, an increase of 36.5 days per acre. The three plots were grazed in rotation, the same animals being used on all the plots.

From the data secured so far this year, and from the appearance of the plots, it is expected that the difference in yield between the fertilized and the unfertilized plots will be even greater than during the first year of experiment. Up to the middle of July, 1931, the average yield of the fertilized plots was 7,058.3 pounds of dry matter per acre as compared to 5,243.3 pounds for the check plot. The grazing yield during the same period was 210.6 ten-hour grazing

(*Turn to page* 52)

Marketing Quality Vegetables

By M. D. Butler

County Agent, Marion, Indiana

THE market gardens and retail and wholesale business of Clarence Moore and Dave Reynolds at Jonesboro, Indiana, are made more conspicuous by being located in a section that regularly imports from 75 to 80 per cent of its fresh fruits and vegetables. In way of contrast, this community ships in less than 10 per cent of its pork and beef requirements.

In other words one driving into Marion, Indiana, any time of the year will be conscious of the fact that he is in the corn belt and in one of the largest hog-producing counties of that section. On the banks of the Mississinewa at a certain bend in the Muncie Pike one suddenly approaches a 20-acre tract of sandy loam "upper bottom" this being the producing end of the business of Moore and Reynolds, producing from May 1 to December 1 an average of three truck-loads of fresh produce daily.

One retail establishment is maintained in Marion by Reynolds, and both his and Moore's trucks make three or four daily deliveries of fresh products to this store as well as to 80 per cent of the stores in Marion. Crops in surplus quantities are easily marketed in Hartford City and Kokomo. Frequent deliveries permit the use of their slogan "fresh produce direct to the consumer," and in the opinion of Reynolds is the reason for the fact that of the vegetables shipped to Marion most of the shipments consist of out-of-season produce and potatoes.

Other local growers use Reynolds as an agent in retailing. Joe Shane, a large greenhouse grower and producer of early out-door crops, makes regular deliveries to Reynolds' store. Shane lately has developed his biggest early income from a trade in vegetable and flower plants, the latter out-selling the former.

(*Turn to page* 53)

Clarence Moore's crop of early cabbage was fertilized with 3-8-10 complete fertilizer.

Acting on his newly-found knowledge, Mr. Robinson (left) this year grew wheat, as described by admiring neighbors, "as was wheat." The stalks were almost as tall as he, and he is a very tall man. The yield was 50 bushels to the acre.

A Fallacy Uncovered

By Kope Elias

Farm Agent, Mecklenburg County, Charlotte, North Carolina

FOR many years it was thought that the red clay soils of the Piedmont region did not need potash. Unfortunately this idea is still prevalent with a great many farmers.

For many years Joe H. Robinson believed this fallacy because he had been taught to believe it. He followed it faithfully, and by dint of otherwise good farming he always made more wheat, by several bushels an acre, than the average wheat yield of his section. Six years ago he made 30 bushels of wheat an acre, when the average yield of an average year in his home county of Mecklenburg, North Carolina, was 14 bushels an acre.

But Mr. Robinson has an inquiring mind and is not inclined to accept as true rules of agriculture without personally proving them to be true. His curiosity about the old rule concerning potash on red clay land, together with a systematic plan of soil improvement, this year delivered him 50 bushels an acre of wheat—an all-time county wheat record which nearly quadrupled the county's average wheat yield.

This farmer for a long time pondered the question as to why the local soil limited wheat production to an average of from 10 to 20 bushels per acre. He believed that but for some undiscovered deterrent, the yield should be more than twice that figure.

Because he was convinced of that, he set about on a selected 10-acre tract to prove to himself that more wheat than had ever been raised on Mecklenburg county soil was a reasonable pos-

sibility. The history of his adventure in progressive farming sets him apart as a master at soil building and as one with an innate understanding of what a growing crop should have.

His program covered a period of six years, with the unchanging purpose in view of determining how much wheat under reasonable conditions his soil would produce.

Before 1925 he had made good average yields. That year, with good cultivation and fertilization according to the accepted rules of wheat growing, he made 30 bushels an acre. That was better than the average, but he was not satisfied. Some further obstruction, unknown to him at the time, was yet to be discovered.

He sowed red clover on top of that crop of wheat and after one cutting turned it under for soil improvement. For six years, in that manner, he alternated wheat and red clover. The year 1926, therefore, was a red clover year, given to hay gathering and soil building, so far as that 10-acre tract was concerned. That fall he planted wheat again.

In 1927 his wheat yield was 35 bushels an acre on his 10-acre experiment, five bushels more than his previous wheat harvest. That year he again sowed red clover.

By the next spring, 1928, he had begun to form ideas as to how he would proceed with his experimentation. In August he turned in his clover, limed his field, and began experimenting with fertilizer. To an acre he distributed 700 pounds of 10-0-4 (PNK) fertilizer, discarding nitrogen since his legume crops had furnished that. On one half of this field he put 50 pounds of potash to the acre, placing no potash on the other half of the field except such as was contained in the commercial fertilizer.

It is notable that in 1929, when he harvested the crop, his yield was 40 bushels an acre on the section where there was less potash, and on those acres where he had distributed his additional bit of potash the yield was 42 2/3 bushels an acre—nearly three bushels difference for 50 pounds of potash, and that on red clay land once supposedly abounding in potash.

It was not necessary for him to plant clover that year, the volunteer crop being sufficient. This, in due course in 1930, was mowed and later turned under. And that leads up to the sow-

(*Turn to page* 60)

In this field in 1929, Mr. Robinson (right) demonstrated the fallacy of an old theory that red clay needs no potash. The yield was 42 2/3 bushels to the acre.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

IN this day and age of somewhat careless diction, it is pleasing to learn that the late Dr. William Frear, professor of experimental chemistry, Pennsylvania State College, used immaculate English in his writings and addresses. It is unusual to have such an attribute and attainment stressed in a biographical sketch; but it evidently appealed strongly to Thomas I. Mairs, Professor of Agricultural Education, Pennsylvania State College, when he wrote a notable account of Dr. Frear's life, in his admirable book, "Some Pennsylvania Pioneers in Agricultural Science."

"Few men had the accurate knowledge of the English language which Dr. Frear possessed," Professor Mairs says. "The fluency and accuracy with which he wrote was too great to be the result of mere literary and classical college training. His vocabulary was noted for its breadth and variety, as well as the skill with which he used it. While, at times, in his speech he may have seemed verbose, he never resorted to slang or expletives, and it could not be said of him that 'he darkened counsel with words without knowledge.' His knowledge of English, the facility with which he wrote, and the accuracy of the language of the Pennsylvania Food Laws have made them a model for other States."

Therein, surely, is food for thought and consideration. That the composition of many agricultural experiment station publications is faulty in many respects cannot be gainsaid. It would be well, therefore, were the example set by Dr. Frear as a writer heeded by the rising generation of research workers, that their reports may be couched in simpler, clearer language which will be better understood and appreciated by both the professional and the practical reader.

Apart from his fine command of the English language, Dr. Frear was an eminent scientist in the field of agricultural chemistry, and a versatile genius in many other respects.

Reared on Farm and in City

William Frear was born in Reading, Pennsylvania, on March 24, 1860, and reared in the city and on the farm. His father, Rev. George Frear, was a Baptist minister, descended from Hugo Frear, a French Huguenot, who settled in New Paltz, New York, in 1677. Throughout his life, the son was true to his religious training, but of such breadth of Christian character that although affiliated with the Baptist denomination, he worshipped with the Presbyterians of State College, while resident there. His versatility is evidenced by the fact that frequently he sang in the choir and often served as organist or pianist.

Professor Mairs says that Dr. Frear was a generous and loyal supporter of the church and through his influence, more than anything else, the community was not burdened with the support of a Baptist organization before the population and membership

warranted it.

After attending the public schools of Reading and Norristown, Pennsylvania, William entered Bucknell University. At first he was most interested in civil engineering; but soon he was more attracted by chemistry and the natural sciences, and later, was appointed assistant in those subjects. Shortly after receiving the degree of Bachelor of Arts at Bucknell in 1881, he took graduate work at Harvard and the Illinois Wesleyan University, and in 1883 was given the degree of Doc-

DR. WILLIAM FREAR

tor of Philosophy by the latter institution.

From 1883 to 1885, he was assistant chemist to the U. S. Department of Agriculture, at Washington, D. C., under Dr. Harvey W. Wiley, and there gained experience which was to be of great service to him throughout life. Dr. Wiley said of his service with him that Dr. Frear, at that early date in his professional career, manifested the orderly arrangement in all he did which became so great a factor in his future success. When the Bureau of Chemistry organized its Committee on Food Standards, Dr. Wiley appointed him chairman, and pronounced his work "phenominal," while all his co-workers appreciated his wonderful power of orderly research.

Dr. Wiley further stated that Dr. Frear was an early and enthusiastic member of the Association of Official Agricultural Chemists, and contributed much valuable work to that organization which was, perhaps, unique in the history of agricultural chemistry in the world. His work as professor of experimental agricultural chemistry at Pennsylvania State College from 1885 to 1922 was in direct line with his early experiences in the Bureau of Chemistry in research study of food adulteration.

"Dr. Frear's early death (Jan. 7, 1922)," said the late Dr. Wiley, "was not only a great loss to agricultural chemistry and food science, but also a keen personal bereavement. With his death, three of the original members of the Food Standards Committee, namely Dr. Scovell and Dr. Weber, have passed on to the long, long trail."

Active in Agricultural Organizations

In 1885, Dr. Frear was appointed Assistant Professor of Agricultural Chemistry, in Pennsylvania State College. In 1886, he was made Professor, and served as chief of that Department until the time of his death. He was also Vice-Director and Chief Chemist of the Experiment Station, from its organization until his decease. In 1888, he was appointed Chemist of the Pennsylvania State Board of Agriculture, and served until 1919, when the Board was abolished. He had charge of the fertilizer analyses of Pennsylvania from 1888 to 1919; was chemist of the Cattle Food Control, 1902 to 1905; edited Agricultural Science from 1892 to 1894; and was on the Board of Editors of the Journal of American Official Agricultural Chemists, from 1920 to 1922. He acted as Secretary of the Society for the Promotion of Agricultural Science from 1893 to 1895,

and was its president in 1903.

Dr. Frear was also a Fellow of the American Association for the Advancement of Science, a member of the American Chemical Society, the Academy of Political and Social Science, Franklin Institute, Philadelphia, and the Washington Academy of Science. He was, likewise, a member of the following fraternities: Phi Kappa Phi, Alpha Zeta, Phi Kappa Psi, and Alpha Chi Sigma, and of the Cosmos Club of Washington. In Masonry, he served as Master of Bellefonte Lodge, No. 268, in 1907, and was Past Commander of Constans Commandery. He was also a member of the Consistory of Williamsport and, for a number of years, a member of Victor Grange at Oak Hall Station.

An Authority on Fertilizers

As an Institute worker, Dr. Frear was regarded as an authority on fertilizers and of chemistry in general. As a food expert, he had no superior. He was often called as a witness in court, and was never confused in his testimony. Always, he was an active crusader against food adulteration.

At the time of the establishment of the Pennsylvania Agricultural Experiment Station, under the Hatch Act, June 30, 1887, Dr. Armsby was elected Director, and Dr. Frear Vice-Director and Chemist. Until Dr. Armsby reached the College, about January 1, 1888, Dr. Frear acted as Director. He wrote practically all of the Annual Report of the Experiment Station for 1887, and continued to carry on the experimental work with one assistant.

In 1887, the Weather Observations, which had been started by Professor Waring about 1857, were transferred to the Department of Agricultural Chemistry in charge of Dr. Frear, to connect them closer with the agricultural experiments. His special study of meteorology made him an authority on the climate of State College. He was keenly interested in meteorology and taught the subject during all his active teaching career. In addition to teaching practically all of the agricultural chemistry until 1908, and supervising all agricultural analyses, he had time to give much personal attention to the Experiment Station work, and particularly to new projects. As Chairman of the Committee on Research, of the Experiment Station, it was his duty to criticize and pass upon the outlines and plans of all proposed projects. "He always took a great interest in the men that worked under him, encouraging them to advance, giving them all the assistance possible. He regarded the advancement of his men as a particular part of his work." (Mairs).

Dr. Frear not only wrote the first published Report of the State College, for 1885 and 1886, but conducted all the experiments on which it was based. Besides having charge of the general fertilizer plots which had been planned and laid out by Professor Jordan in 1881 on what was then known as the Central Experimental Farm, he conducted a number of variety tests, germination tests, trials with new forage crops, plow tests, feeding experiments, fertilizer analyses, and milk tests. He also directed the work of the Eastern Experimental Farm. The sixteen agricultural bulletins, published prior to the establishment of the State Experiment Station, were collected by Dr. Frear and reprinted in the Annual Report of the College, for 1886.

Issued Pennsylvania Bulletin No. 1

Bulletin No. 1 of the Experiment Station, issued October 1887, was written by Dr. Frear, and was chiefly devoted to "Studies upon the Composition and Development of Soiling Crops." It also contained an historical sketch of the agricultural experiments conducted by the Pennsylvania State College from 1857 to 1887. Dr. Frear closed the historical sketch with the following remarks: "An examination of the lists of experiments re-

(*Turn to page 55*)

Fertility *and* The Black Spot of Roses

By C. T. Gregory

Pathologist, Purdue University Agricultural Extension Department

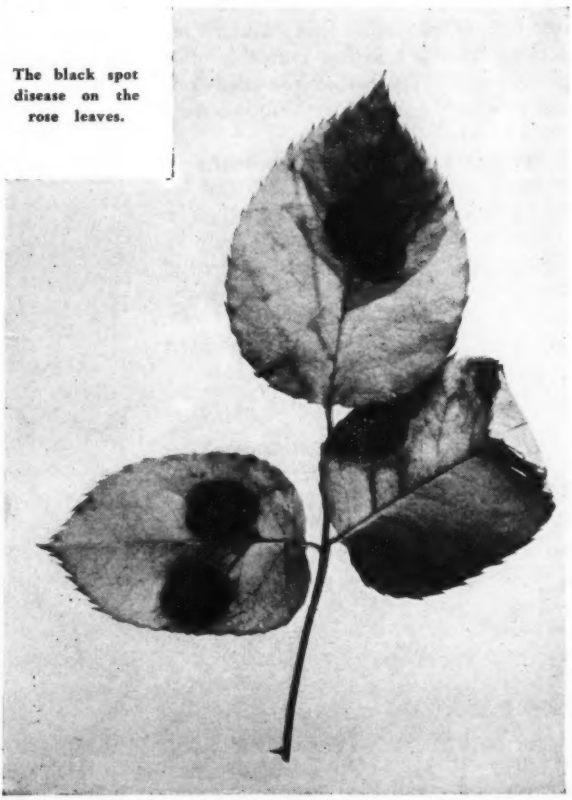
TO some florists the black spot disease of roses is much dreaded. They are not able to hold it in check without a continual battle. Others are quite unconcerned about the disease, not because it is not present but because they feel that if it should appear they can control it at will.

Black spot is a disease of the leaves and has been found to be due to the fungus, *Diplocarpon rosae*. One or more spots on the leaf quickly turn the tissues yellow and cause defoliation. In the garden this disease has been controlled by dusting with sulfur. The fungus lives over winter in the fallen leaves and the destruction of these dead leaves is an important step in controlling the trouble.

In the greenhouses the problem of control is much more difficult. The conditions favorable to the spread of the disease may be sustained over a long period. The frequent syringing of the plants to control red spider may keep the leaves wet for a considerable time if great care is not taken in ventilation and in the time of day when the plants are syringed. The plants are close together, greatly facilitating the spread of the fungus.

Most of the expert rose growers in Indiana's largest greenhouses have expressed the same idea relative to the control of this disease. Their various-

(*Turn to page 56*)



The black spot disease on the rose leaves.

Potash Needs *of* Illinois "Alkali" Soils

By Jerome J. Henry

Chicago, Illinois

"ALKALI," when we hear the word it often brings to mind what we've read in story-books, stories of the alkali plains of our spacious West, areas which are so devoid of rainfall that soluble salts remain at the surface of the soil undissolved. Some of us have seen these areas first-hand since the days of modern travel, but few of us realize that "alkali" reactions are the limiting factor in soils in the fertile regions of the Midwest, the country's most productive section.

Many acres of more or less unproductive soil known as "alkali" and located in the northern half of Illinois, in an area which as a whole is very productive, may be greatly improved for crop production by the application of potash salts, according to O. H. Sears of the University of Illinois experiment station.

Needs Were Recognized Long Ago

As far back as 1912 the need for potash on these soils was recognized. Similarly, on other soils in the southern third of the Prairie State, famous as the center of the corn and hog belt of the country, the need for potash seems to be developing and is usually associated with the repeated growth of sweet clover on the field.

Studies carried on by University of Illinois soil scientists reveal that two factors contribute to the unproductiveness of these soils: first, a deficiency of available potassium; and second, an excessive accumulation of nitrate nitrogen. The first is connected with the presence of high lime content in a large percentage of cases, and in other instances with a low amount of potassium in the soil.

The second is the result of conditions favorable for nitrate formation especially in the presence of calcium carbonate and an abundance of readily nitrifiable matter.

A number of experiments were planned in Illinois to find the cause of the unfavorable conditions on these soils. The "alkali" soils occur in tracts of varying size,—some a few rods square, others containing many acres. They are usually found in connection with swamp land that has been reclaimed by drainage and brought under cultivation.

The corn crop is affected by the unfavorable conditions most seriously. It germinates well and makes normal growth during the first few weeks, then ceases to grow, turns yellow, and finally presents an appearance of being badly diseased. Small grains produce an abundant vegetation, but lodge badly and a low yield follows. Sweet clover, according to the experimenters, makes a splendid growth.

"After drainage has been obtained, the capacity for crop production on the soils is greatly increased by the application of potash salts and the use of straw, corn-cobs, or manure, particularly horse manure. With these

treatments the soil often surpasses yields on fertile soils surrounding them.

"A whitish deposit on the surface of these soils, when dry, is a characteristic which led to the general adoption of the word 'alkali' for the designation of the unproductive areas. Although it is generally recognized that the alkali differs from the black alkali of the arid regions, opinion differs as to the cause of the unproductiveness of the soil."

But the investigations reveal some interesting facts arrived at by intensive and extensive research in the greenhouse and field.

The Benefits from Potash

Under greenhouse conditions using deep peat soil from Cass county, Illinois, it was found possible to increase the growth of corn as much as 224 per cent by treating the soil with a combination of potash and straw mulch. Potash alone accounted for a gain of 126 per cent, and straw alone approximately the same increase.

Commenting on these results, the investigators point out that the value of straw for the improvement of these soils was not confined to the potassium it contained. A beneficial influence was exerted through a lowered nitrate nitrogen content as a result of micro-organic activity.

On the other hand, sweet clover makes an excellent growth on Illinois alkali soils. A peculiar fact observed is that the poorest corn in the field was found in the area where the largest amount of sweet clover was plowed down. This condition might have been attributed to a moisture effect, the scientists suggest, were it not for the fact that splendid corn was grown under the same conditions when potash was applied. The data indicates that any soil benefit derived from an increased availability of potassium brought about by the growing and returning of sweet clover to the field is nullified by the increased nitrate nitrogen which accumulates as a result of the rapid decay of the sweet clover.

In spite of the fact that alfalfa makes a better growth than corn on these alkali soils, it may also be benefited by the same fertilizer treatments,

In Cass county, Illinois, potash again proves its value. Potash and no potash means the difference between "knee-high" and "man-high" corn.

In Whiteside county, Illinois, these striking results were obtained. The corn at the left was fertilized with potash; the corn in the center received no potash.

but in a lesser degree. One experiment where soil was treated with potash and straw showed a gain in yield of alfalfa of more than double the untreated plots. Muriate of potash alone increased the gain a similar amount.

Further experiments carried on in McHenry county resulted in some rather astounding results concerning the value of potash treatment. On a brown sandy loam soil, the increase in corn yield was nearly 55 bushels per acre, or 60 bushels compared to 5.75 on untreated soil. The result was obtained by drilling 75 pounds of potash with the corn in the hill. Much less favorable results were obtained by broadcasting 160 pounds of potash per acre. A straw mulch alone gave results about equal to broadcast potash.

Potash Availability

It is believed that the availability of soil potassium is lowered by the presence of calcium carbonate (lime). The soils are well supplied with carbonates, so it appears quite probable that the low crop yield resulted at least in part from a lack of available potassium. Tests were made to determine the availability of potassium in the soils in an attempt to substantiate the belief that the soils lacked in the availability of potash rather than in total content. They disclosed that but little potassium exists in an available or soluble form.

"Although the observations explain the responsiveness of the soils to potash fertilization, they do not furnish the reason for the greater effectiveness of hill-dropped salts, particularly since the acre rate of application was less than one half as high as the broadcast method. There remains the possibility that the same condition that contributes to the low availability of the native soil potassium may also render applied potash unavailable," the experimenters reasoned.

So laboratory experiments were conducted, and they showed that as the amount of potassium added was increased, the percentage of absorption by the lime in the soil, or its unavailability, decreased. This substantiates the observations that hill-dropping was most effective because it concentrated the applications in a smaller effective area around the hungry plants.

Summary

The work of the scientists is summarized briefly as follows:

"The unproductiveness of numerous areas of land in the northern half of Illinois is caused, not by a single condition, but is the resultant of two factors, namely, a low availability of potassium and an excessive amount of nitrate nitrogen.

"The low availability of potassium on most of these soils is due to an alkaline reaction rather than a marked deficiency of this element.

"The value of straw for improving

(*Turn to page* 53)

Kainit Kills Moss

By Thomas H. Blow

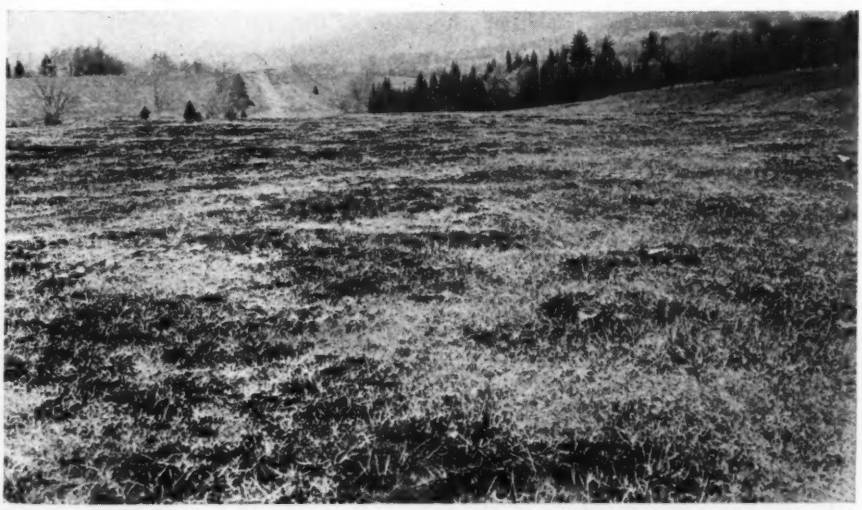
Springfield, Massachusetts

KAINIT (20 per cent potash) at the rate of 600 lbs. per acre has been effectively used to kill moss in the pasture of Harry Neuland, Morrisville, Vermont.

With the kainit applied in the late spring of 1929, the treated area has changed from a mossy sod, providing little or no pasture, to one of clover and grasses with practically a total killing of the moss in 1931. The plot treated with kainit adjoins one of the four-plot pasture tests established in 1929 and now compares very favorably with the sod on the LPK and LNPK plots in this test. The lesser treatments of lime and phosphorus have shown little or no improvement on this pasture.

To make the treatment more effective, it is advisable to apply the kainit when the sod and moss is wet preferably before or immediately after a rain. The addition of clover and grass seed, while omitted in this test, would undoubtedly speed up the reclamation process. Another plot treated at the rate of 400 lbs. per acre did not show as good results as that receiving the heavier application.

Editor's Note: More information on the use of kainit for killing undesirable plants will be found in the article "The Toxicity of Certain Fertilizers" by Professor A. Bruno on page 41 of this issue.



Left—Untreated **Right—Treated with 600 lbs. of 20% kainit per acre**

Farm of Harry Neuland, Morrisville, Vermont
Note the clover coming through the moss which has been killed on the right.

High-yielding Ears

By E. N. Bressman

Associate Professor of Farm Crops, Oregon Agricultural College

FOR many years growers have been trying to associate the characteristics of an ear of corn with its yielding ability, and since 1900 many experiment stations have been trying to show by experimental methods which characters, if any, are associated with ability to yield. These tests have shown that most of the so-called score-card characters have no connection with the yielding ability of ears.

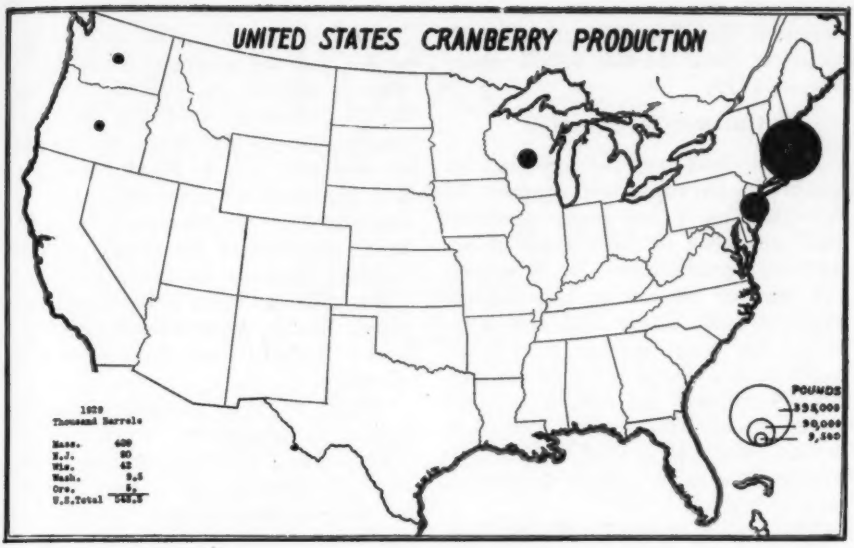
Results at the Iowa Experiment Station are of interest because they show definite relationships between ear and kernel characteristics and yielding ability. In general, they found that with the Reid Yellow Dent strain of corn, the longer and heavier ears gave larger yields. Ears with 16 rows gave larger yields than ears with a greater number of rows. The ears with a medium wide spacing between the rows were better than were those that had a close spacing. The smoother indentations gave higher yields than the rougher ones. A relation between hard, horny kernels and yielding ability was found. The large kernels were much better than the small, shallow, thin kernels. Ears well matured and cured were much better than ears which had blistered kernels and were poorly filled out. They found no relation to exist between the shape of the ear and yield.

The work is not the result of selection over a long period of years, but does give results of comparing all ears produced in a given area regardless of the size or appearance of the ear.

Many growers put too much emphasis on selecting for some unimportant variety characteristics. On the other hand, there are many who believe that nothing can be told about an ear of corn by looking at it. Some selection must be used, however, if progress is to be made, and without a doubt the above characteristics are valuable in selecting in the right direction as far as yielding ability is concerned.

There is no doubt that selection of a particular type and kind of ear will have more influence on other characters of the plant than on yielding ability. For example, growers can shorten the number of days required to mature a variety of corn by selecting the earlier ears. The height of the ear on the stalk can be materially changed by selection. The oil content of the protein content may be changed by selection methods.

These ears are representative of the entry which made the outstanding yield in the open-pollinated class of the Iowa Corn Growers' Yield Test.



Cranberries

By W. H. Ebling

Agricultural Statistician, Madison, Wisconsin

FOR most of us holiday dinners are incomplete without the cranberry. Even the Christmas or Thanksgiving turkey would not be the same without cranberry sauce. While most people seem to be fond of cranberries, many know very little about the crop or where it is grown, largely because of the fact that it is produced commercially in only a few States.

The cranberry is a small, low-growing shrub whose branches are spoken of as vines. It grows mostly in marshy areas and there are a number of varieties. It is a water-loving plant and is associated with regions where much water is available. In nature it is found over wide areas of North and South America, Europe and Asia, but its commercial development, particularly in the United States, is localized.

In the United States commercial cranberry production is largely confined to five States—Massachusetts, New Jersey, Wisconsin, Washington, and Oregon. It will be noted by the map published herewith that there are really three cranberry regions—the East Coast region which consists of the Cape Cod area in Massachusetts and that in New Jersey; the Wisconsin cranberry region; and the West Coast region, which is along the Columbia river in Washington and Oregon. Of the 1930 crop about two-thirds came from Massachusetts; about one-fourth from New Jersey; and the remainder from the Western areas. Wisconsin's production is about 7 per cent of the United States total. The country's production in 1930 was

estimated at about 570,000 barrels which is about 24,000 barrels above that in 1929.

Culture Is Complex

As an industry the growing of cranberries is exceedingly complex. In most regions it has many problems quite unknown to other types of agricultural production. In Wisconsin and some of the eastern bogs for example, a much larger land area is required for water storage than is actually used in the growing of cranberries. Sometimes this ratio is as much as ten to one. Thus a cranberry grower may have a large land area and yet have only a small acreage in production.

The vines are usually flooded several times during the year. Commonly they are flooded in the late fall so as to be under water during much of the winter, and again in May or June to control certain insects. In addition, many of the cranberry bogs are developed on peat soils which are likely to catch fire in dry seasons and be virtually destroyed unless there is a water supply available. In the more northern cranberry regions the frost problem in late summer and fall is often serious. Frost damage not infrequently reduces the crop very greatly and flood water is one means of protection against low temperatures.

In the Washington and Oregon areas flooding is not practiced, for there usually is no water supply available. The soil situation here differs quite strikingly from the eastern cranberry regions, and the crop is developed on a dry bog depending upon the water supply in the ground. Under these conditions insect damage is often much more serious than in the eastern areas where flooding is practiced. Spraying is resorted to for insect control and this is expensive.

In the planting of cranberry bogs areas are usually chosen in which the crop grows naturally or where conditions are particularly favorable. Usually sandy or peat marshes are most desirable and the problem of clearing is often a serious one. Before planting of the cranberry crop, the fields are usually cleared completely and leveled so that they can be flooded properly. The plantings are commonly made by cuttings from the vines of other cranberry bogs which are usually planted in rows from six to ten inches apart. These cuttings when planted and kept moist, usually grow quite readily, and make a crop in about three years after planting.

Much work is necessary in maintaining a productive cranberry bog. The problem of weed control is particularly serious, and a large portion of the maintenance cost is in weeding. Covering the bogs with sand is commonly practiced, particularly in the eastern cranberry regions, the sand cover serving several purposes, but more particularly that of weed control. The maintenance of ditches and dykes, as well as reservoirs of water is another important item of cost. The ditches are necessary for two purposes—to provide drainage when needed and to enable the grower to flood his bog when desired.

The cranberry usually blossoms in June, and harvest occurs in September or October, depending somewhat upon the location of the particular bog. The bright red berries are harvested either by hand-picking or by the use of a small tool known as the cranberry rake. While hand-picking is still used extensively, it is less common than formerly, the rake being widely used in the large commercial areas.

Marketed as Fresh Fruit

Most of the crop is disposed of as fresh fruit during the late fall and winter, particularly in connection with the holiday season. Manufacture into cranberry products such as sauces and jellies is common on the part of housewives who desire to have the product of this fruit available throughout the year. In recent years

(*Turn to page* 53)

More Food *for* Potatoes

By R. F. Thomas

Houlton, Maine

HIGHER rates of application per acre of fertilizer containing more potash are rapidly becoming common practices with the Aroostook county, Maine, potato producers.

Prior to the World War a 4-6-10 was the common analysis in this section and 1,400-1,600 pounds was about the average application per acre. Following the war the 5-8-7 became the standard analysis and the amount applied increased to 1,800-2,000 pounds per acre. It was thought that the application limit had been reached, but there were some of the best farmers who felt that if 1,800-2,000 pounds were better than 1,400-1,600, still more would produce better results.

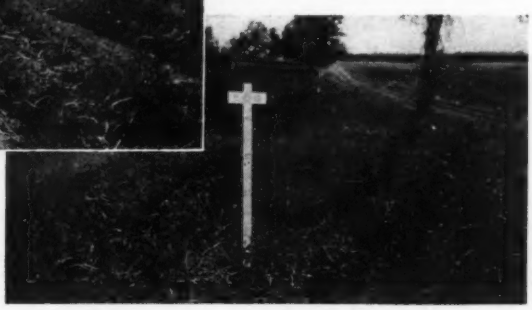
An expression heard on some of the best farms is—"I notice that 500 pounds above a ton gives them an extra wallop." This initiative has brought about a gradual increase, so that now the best farmers are applying 2,500 pounds per acre of such analyses as 5-8-7, 5-8-10, (125 pounds nitrogen, 200 pounds phosphoric acid, and from 175 to 250 pounds of potash) or the equivalent in such analyses as 6-8-12, 7-10-14, 7-11-10, 10-16-14, 8-13-11, and 10-16-20. The saturation point has not been reached yet, for there are some who are stepping the rate up to 2,800-3,000 pounds per acre, all applied under the crop, with excellent returns.

Even with this high rate of plant food applied, there were some who felt that due to the lack of potash in fertilizers during and immediately following the war, the Aroostook soils had been severely depleted in available pot-

(*Turn to page* 51)

Above: The tops of potatoes fertilized with 5-8-7 on the farm of E. L. Cleveland Co., Houlton, Me., were practically dead on Sept. 12. The plot yielded 123.2 bbls. (total yield) and 108.8 bbls. U. S. No. 1's.

Below: The tops of these potatoes fertilized with 5-8-10 on the same farm were still green on Sept. 12. The total yield was 155.7 bbls. of which 144.9 bbls. were U. S No. 1's. Extra potash made the difference.



Winter Weed Hosts

By O. C. Lee

Purdue University Agricultural Extension Department

DURING these days of modern farming we are impressed more and more with the fact that after all, successful farming is in reality a battle against pests, many of which make their winter home in waste place weeds. In the roots and dead stalks of weeds insects spend the winter in the form of eggs or pupae, or even in the adult stage.

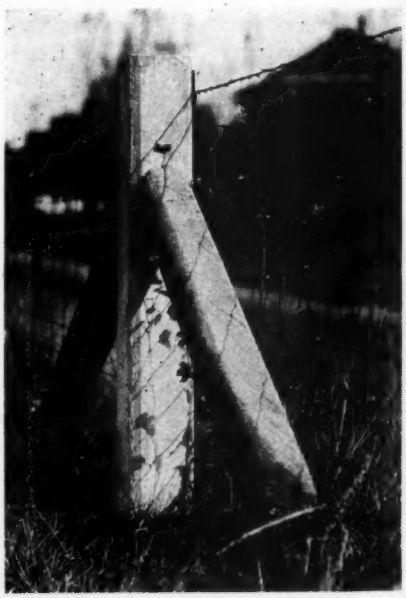
Take for example our old enemy the chinch bug. Fence-row weeds offer ideal protection for this great crop destroyer during the dead of winter. Burning this vegetation will not only help immeasurably in holding the chinch bug in check, but in addition will do much to keep the weeds themselves under control, since burning destroys many weed seeds that would otherwise cause future trouble.

Clean Up the Garden

We should also consider the garden. How frequently the crop is all but ruined by insects and diseases and by numerous annual weeds, the direct result of neglect in years past! By cleaning up the garden and the vicinity of all crop refuse, particularly the weeds, much will be done to avoid trouble in the season to come. A few stalks of pesky weeds may spread enough weed seeds to infest the entire garden, necessitating continual summer hoeing to save the crop from disaster. A little time spent in the way of cleaning up will be equal to many days of hard labor with the hoe in the hot sun.

The melon aphid is a serious pest on melons, squashes, and cucumbers. This prolific garden pest lays its eggs on the common orpine, or live-forever, where they spend the winter and hatch the following spring into myriads of lice that feed on the production of the gardens. Evidence points to the live-forever as the sole winter host of melon aphids, consequently the extermination of this weedy species will rob the insects of their home and reduce damage to succeeding crops.

The eradication of milkweed is a rather difficult problem as the running roots spread and reproduce each year. Fall plowing in the field so as to turn up the roots and expose them to freezing weather is a means of control. Where cultivation is impractical, hand digging is essential. The pokeroot on



A single plant of wild lettuce growing in the fence-row, if allowed to go to seed, will infest large areas.

The horse nettle, in addition to being a bad perennial weed, is a carrier of mosaic disease.

the other hand is not as prolific a grower and can be eradicated by cutting some few inches below the ground with a spud or spade. In every case the tops and seed pods should be burned to prevent reseeding.

The more we learn of virus diseases of plants, the greater we are impressed with their importance and also their relation to many common weeds. Some time ago a new chain of evidence was unearthed against a common trouble of tomatoes and tobacco known as mosaic, a disease distinguished by a mottled crinkled appearance of the leaves of infected plants and greatly decreased yields. This trouble is also caused by a virus that spends its winters in the creeping perennial roots of ground cherry and bull nettle. The plant lice and leaf-hoppers are effective carriers of the dangerous virus from infected weeds to the crop plants.

The bull nettle is a perennial plant reproducing by running root stalks and besides being a carrier of mosaic is a noxious weed. Extensive cultivation is a practical means of control in fields while the chlorate spray has its place where the plant is found growing in small patches or in waste places where cultivation is impracticable.

The bull nettle can easily be distinguished by its spiny stems and leaves. It grows to a height of from one to two feet and has a yellow fruit in the fall resembling the small tomato. All efforts to eradicate this bull nettle should be made before it becomes wide-spread as it may become a pest equal to that of the well-known Canadian thistle.

Another virus is believed to be the reason why potatoes "run out." There is strong evidence that this particular virus is distributed mainly if not entirely by certain species of plant lice that dwell during the cold months on waste place weeds, particularly on wild roses. Here is another argument for keeping the fence-rows clean, mainly of wild roses, in the vicinity of potato fields. Still another insect enemy of the potato crop that is dependent on weeds is the stalk borer, which utilizes grassy and weedy places for winter hibernation.

Probably the most destructive of all insects is the deadly European corn-borer which winters over mainly on corn-stalks although it is occasionally found hibernating in cockleburs, smartweed, ragweed, and a host of other flashy stemmed weeds. Then there is the plum curculio, the corn-stalk borer, squash bug, and various species of leaf-hoppers, all winter inhabitants of various weeds about the farm.

Fall Affords Time

Nothing is more unsightly nor awards a better breeding place for crop pests than dead vegetation, particularly vegetation of plants that we have learned to know as noxious weeds. It is true that the best time to kill weeds is during the summer, but as a last resort a clean-up should be

(*Turn to page* 60)

The field at the right is a good sample of what the land was producing before the alfalfa was put on. Picture taken July 28, 1931, at Phillip Sellew's farm.

A City Man's Alfalfa

By G. C. Dunn

County Agent, Somerset County, Skowhegan, Maine

THAT a man doesn't need to be born on a farm to be a success in farming is admitted by the folks in New Portland, Maine, where Phillip Sellew, formerly a city dweller in southern New England, and his family are now operating a dairy farm.

In a recent interview with County Agent G. C. Dunn and Extension Economist in Farm Management Donald Reed, Mr. Sellew stated, "When I came here five years ago I didn't cut six tons of hay on the whole farm and this year I have put in the barn nearly thirty tons. I have cut two crops of alfalfa off a field seeded in 1928. I have cut one crop off a field I seeded in April this year, secured a wonderful piece of hay from clover seeded last year, and will have another good second crop off that clover."

Mr. Sellew has been able to build up his land and hay crop by the liberal

(*Turn to page* 52)

Fertilizer high in potash and lime were used to get this stand of clover. Picture taken July 28, 1931, at Phillip Sellew's farm.

Liming—
Costs and Benefits

By M. A. Crosby

Washington, D. C.

A SPECIALIST from the Michigan State College, who had just delivered a talk on liming acid soils was approached by an elderly woman who remarked:

"I have realized for some time that I must grow more legumes if I expect to realize a profit from farming. Furthermore, I know that in order to grow legumes successfully, my land must be limed. BUT! I haven't the money with which to buy lime!"

This, in a nutshell is a problem that confronts thousands of farmers throughout the eastern two-fifths of the United States. Where acid soils are prevalent farmers generally are sold on the need of liming land for growing legumes, especially alfalfa and sweet clover. They know that a sweet soil means more legumes, and that more legumes mean better yields and reduced production costs for staple crops. But in many sections ground limestone is expensive, and the initial cash outlay for lime is considerable. As a result of this first cost, the use of lime is restricted. Relatively few farmers can afford to lime their entire farms in a single year, or even in one rotation period, hence the majority of those undertaking a liming program are compelled to limit their operations to a few acres a year.

It was formerly thought that in order to grow alfalfa or sweet clover successfully, an application of lime sufficient to neutralize the soil was necessary. Fortunately this is not always the case. In many instances it has been found that satisfactory results can be obtained from the use of comparatively light applications—say from 400 to 500 pounds per acre—of finely-ground limestone drilled in with the seed. This is particularly true in the case of sweet clover. This practice enables the farmer to cut his liming costs in any one year to a minimum, and is resulting in a tendency toward the use of lighter and more frequent applications of lime rather than heavy applications once in several years. A further advantage of this method is that it permits an annual liming of a much larger acreage than is possible if heavy applications are used.

The Benefits of Liming

What are the actual benefits obtained from liming?

Highly satisfactory results in increasing crop yields by the use of lime have been obtained by many of our State Experiment stations. The Agricultural Experiment Station of the University of Illinois probably leads in the matter of experimental work with liming. According to Dr. F. C. Bauer of that Station, "Results obtained from 26 experiment fields show the almost universal need for lime on Illinois farm lands." The results referred to show that on dark-colored Illinois soils an annual application of 952 pounds of lime per acre added $4.67 to the annual acre value of crops in a system

of livestock farming, and $5.99 to the acre value of crops in a system of grain farming. On light-colored soils an annual application of 868 pounds of lime per acre increased crop values to the amount of $10.98 per acre in a livestock system, and $8.92 in a system of grain farming

The light-colored soils here referred to are acid, and will not grow sweet clover without lime. Where such land was limed and seeded to sweet clover, and this crop plowed under for corn in a corn, oats wheat, sweet clover rotation, the resulting increased yield per acre was 12 bushels of corn, 11 bushels of oats, and 10 bushels of wheat. Obviously sweet clover was responsible for much of this increase, but without the use of lime no sweet clover could have been grown.

Increases Due to Lime

Farmers who have limed land for growing alfalfa have increased the acreage of this valuable crop by thousands of acres. Those who have limed for the purpose of growing sweet clover in their regular cropping systems report increased yields of 10 to 20 bushels of corn, and 5 to 20 bushels of wheat. Here again the increased yield is largely due to sweet clover but—no lime no sweet clover.

An outstanding example of benefits derived from liming land is the experience of D. O. Belt, one of Missouri's Master Farmers.

After twice failing to get a stand of sweet clover without liming, a 20-acre field was given an application of 2.5 tons of ground limestone per acre. The lime cost $2 per ton and the total cost of liming, including the labor of hauling and spreading was $7.50 per acre.

This field was seeded to winter wheat, and the following spring sweet clover was seeded on the wheat at the rate of 15 pounds per acre. After wheat harvest this 20 acres of sweet clover provided pasture for 16 dairy cows and 135 hogs from July 7 to October 31.

Early the following May the sweet clover was plowed under for corn. Superphosphate at the rate of 200 pounds per acre was applied on part of the field and part was left unfertilized as a check. The unfertilized portion averaged 80.57 bushels of corn to the acre. The three previous crops of corn on this field had averaged 42 bushels to the acre. The increase from the use of lime and sweet clover was 38.57 bushels per acre.

The Costs of Liming

But what about liming costs? Once the farmer is convinced as to the benefits to be obtained from liming his first thought is: How much cash will I have to dig up to lime 10, or 15, or 20 acres?

In a recent study, liming costs were obtained from 31 farms on which a total of 1,018 acres were limed, primarily for the purpose of growing sweet clover. The quantity of lime applied per acre varied from 1 to 3.5 tons, the average application being 2.65 tons. The cost of lime ranged from $1 per ton for low-grade material to $5.25 per ton for high-grade, finely-ground limestone. The cost per acre of lime applied ranged from $2.90 to $7.70. The total cost of liming, including cost of lime and labor used in applying, averaged $6.95 per acre for the 31 farms.

From these figures it will be seen that a farmer planning a liming program must usually figure on a cash outlay of $3 to $8 per acre for lime alone if a quantity sufficient to correct soil acidity is applied at one time. The farmer who is unable to spend this amount in a single year had best try the plan of applying a light application of finely-ground lime drilled in with the seed at seeding time.

Next to the initial cash outlay for lime the farmer is concerned with the length of time an application of lime will be effective. Will this initial expenditure of $3 to $8 per acre have to be repeated in two, or in six, or in 10

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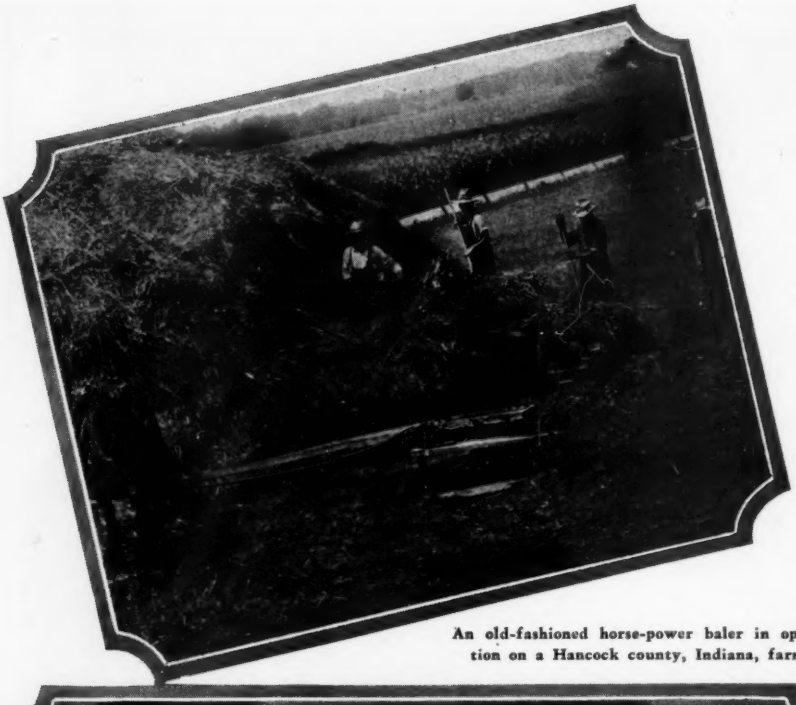
A STUDY IN DISCERNMENT.

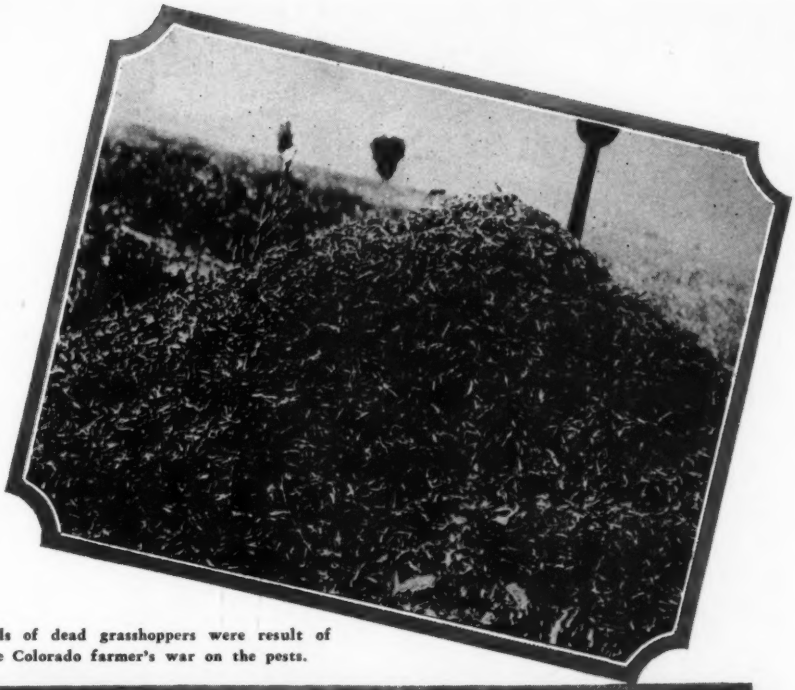
PICTORIAL



An old-fashioned horse-power baler in operation on a Hancock county, Indiana, farm.

By Ewing Galloway, N. Y.

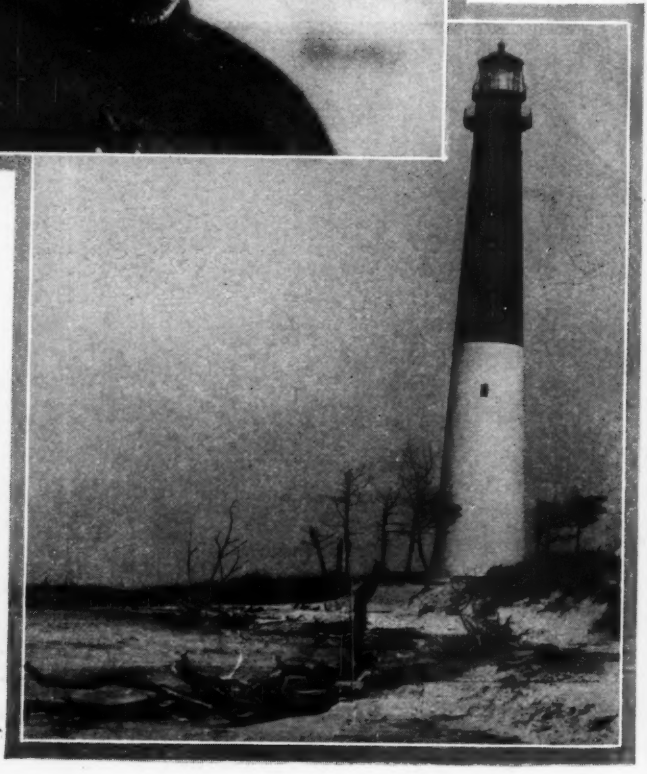
Continuing as one of the favorite pets of children, the Shetland pony is still being raised in considerable numbers for that purpose. Here are three "chums" waiting for youthful riders and drivers.



Bushels of dead grasshoppers were result of one Colorado farmer's war on the pests.

Here is a bear market paying big dividends in laughs. The cubs are shown enjoying their milk on the bear farm operated by H. S. Crowe at Wayne, New Jersey.

An old salt of the clipper days.

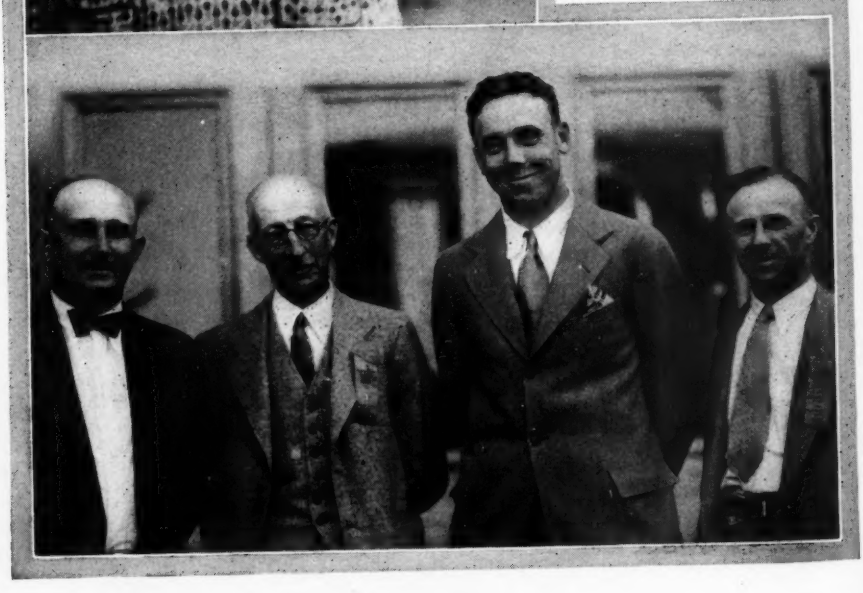


The sentinel of a storm-swept coast.

Cotton prices don't worry him.

The inspiration for many popular songs.

Mrs. O. M. Edrington, Hamilton county farm wife, has added $10,000 to the income of their farm during the last six years by operating a farm market each Saturday in Noblesville, Indiana, the county seat of her county. She sells home-baked pastries, butter, cottage cheese, and poultry products. The picture shows her holding a prune cake which is one of her specialties. Although sixty-four years old, she has not missed a single Saturday during the six years.



The new officers of the American Association of Agricultural College Editors elected at the recent national convention at Oregon State College are: (left to right) Charles D. Byrne, Oregon, President; W. P. Kirkwood, Minnesota, member executive committee; R. M. Soule, Georgia, vice-president; W. C. Schnopp, West Virginia, secretary - treasurer. Roger DeBaun of New Jersey, not shown in the picture, was also elected executive committeeman.

The Editors Talk

Farming on a Business Basis

With so much attention being directed to the plight of the Southern farmer because of the cotton situation, it is very interesting to find in a recent issue of "Manufacturers Record" an account of South Carolina farmers who are maintaining their agricultural practices on a sound basis of prosperity. The instances given are taken from specific examples of Southern farmers who not only know their crops but their markets, which examples are being gathered by the agricultural committee of the South Carolina Bankers Association. The significant facts growing out of this survey are that in this cotton belt of the Southeast, some successful farmers have practically abandoned the growing of cotton and through adequate diversification are pointing the way out.

L. A. Danzler, a young farmer who has rapidly expanded his operations near Eutawville in Orangeburg county, is quoted as saying: "A fault with much farmer thinking, and some other kinds, is that it does not take in enough. I never adjudge a year's operations by a single product or those with a single product by a single year's results. I consider results from all and make decisions as to one by, as a rule, five-year averages." Mr. Danzler dropped the growing of tobacco deciding that it was too risky, because he made a profit on it for two years, lost money on it two years, and broke even on one. He is now holding to the growing of Irish potatoes, though his returns have varied widely. Yet he finds that during a period of five years, all told, he has made some money on potatoes. He is expanding his truck-growing operations, especially sweet potato production.

E. W. King is a large scale producer of vegetables in Charleston county. Mr. King says: "I am holding on to my land. I propose to keep it and work it. Nature is not making any more land of this sort and there is increasing consumption of the kinds of products for which our rich soil and climate are best suited."

Variety is the keynote of the farming of A. D. Atkinson and his son Frank, about half-way between Aiken and Augusta. The Atkinsons keep in the vanguard of variety farming and produce practically everything in the way of food and feedstuffs that is consumed on their place. They were virtually the first to grow grapes for market in this section. Their vineyard is on rather light soil which calls for liberal use of fertilizers. They find farming an intellectually zestful as well as an invariably profitable vocation. Whatever they undertake is carefully thought out and planned in accord with scientific and economic developments.

There is an old saying to the effect that "It's an ill wind that blows nobody good." It is very gratifying in these days of depression to find these instances where careful planning and foresight are placing agriculture on a sound business basis.

Fertilizer Placement

It is expected that many thousands of dollars may be saved farmers as the result of a series of field experiments in the distribution and placement of fertilizers inaugurated this year to determine the most effective methods of fertilizing potatoes with fertilizer distributing machines. The work is being carried on by the Bureau of Chemistry and Soils, U. S. Department of Agriculture, in cooperation with the Bureau of Public Roads, agricultural experiment stations of New Jersey, Ohio, and Michigan, and the soil improvement committee of the National Fertilizer Association. Bailey E. Brown, senior biochemist of the division of soil fertility, is supervising the work for the Department of Agriculture.

"Because of the very large amount of fertilizer required to produce profitable crops of potatoes, this problem is particularly important for potato growers," says Mr. Brown, who further says that until the department undertook the investigations very little information was available as to the relative merits of the American types of fertilizer distributing machines.

Recent investigations by fertilizer specialists of the Bureau of Chemistry and Soils and engineers of the Bureau of Public Roads have shown that a tremendous annual waste of expensive plant food can result from faulty application of fertilizers by some types of machinery in common use on American farms.

Education vs. Propaganda

Rightly has M. S. Eisenhower, Director of Information for the United States Department of Agriculture, taken a definite stand against scattered criticism of the publicity activities in Washington.

In an address at Corvallis, Oregon, before the Association of Agricultural College Editors, Mr. Eisenhower outlined the educational aim of information service, his remarks being in part a reply to several recent magazine articles criticizing "press agentry," "ballyhoo," and "publicity" activities in Washington.

"For the benefit of those who may still be in doubt about the matter," said Mr. Eisenhower, "I say vigorously and unqualifiedly that the information people of the department are in no wise publicity agents in the malodorous sense of that term. We are not interested in acquiring prestige for ourselves, for the institution as a whole, or for any of its head officials, nor to 'sell' the department to the public, nor to advertise the achievements of department workers, nor to make it possible for the institution to obtain larger appropriations, but to make public the results of the department's manifold activities and to give facts the widest possible distribution."

Tracing the haphazard growth of education and pointing out that most institutions had centered on matriculated students, the director said adult education has been all but neglected. "Today," he observed, "no other institutions or group of institutions anywhere play so vital and effective a role in adult education as do the State agricultural colleges and the United States Department of Agriculture. Our efforts in the field of adult education are very young. Being young, unbound by shackling traditions, we are not afraid to use every means developed by science to reach our objective.

"In agriculture there was never a time when adult education was so imperative as it is now. We may suffer some delay in teaching better breeding

practices or improved fertilizer practices, but if economic information is to be of any value at all it must have almost instantaneous and widespread distribution. Our plan, consequently, is not to decrease our press and radio efforts but to increase them with the whole-hearted cooperation of more than 50 per cent of America's radio stations and practically all of America's newspapers, farm papers, and trade journals."

"Government," Mr. Eisenhower continued, "rightfully leaving to business nearly everything it has the profit-incentive to undertake, performs those socially desirable functions that otherwise are being or would be neglected. That was the fundamental that prompted George Washington in 1796 to propose Government aid to agriculture, and it was the fundamental upon which Congress and Abraham Lincoln established the Department of Agriculture in 1862." From the beginning, he pointed out, Congress placed informational work on a par with research and in the organic act directed the department "to acquire and diffuse useful information on subjects connected with agriculture in the most general and comprehensive sense."

Fertilization and the Surplus

In connection with improved practices in fertilization, we sometimes hear the query on the part of the grower—Why should I spend money for fertilizers to produce greater yields when there already is a surplus?

One of the most logical answers to this query recently appeared in an editorial in the *Wisconsin Agriculturist and Farmer* and reprinted in full herewith.

"A Columbia county subscriber takes exception to the following statement, which appeared in an editorial of our March 14 issue: 'Results show that for every dollar spent for fertilizers, properly applied to corn, for example, one obtains a sufficient increase in yield to bring three dollars larger returns.'

" 'This I do not believe to be correct,' writes our correspondent. 'You should have said one receives more bushels per acre after fertilizing the land. Do you know that your statement is a direct contradiction of one made by a member of the Federal Farm Board during recent Farm and Home Week at University of Wisconsin? Fertilizers used by an individual bring an increase in yield, but when a million other farmers do the same thing it certainly does not result in more money for the farmer. I agree that when prices are good the use of fertilizer is advantageous, but at present prices, why should a farmer produce more than can be sold?'

"Our correspondent is right in claiming that it is a detriment to the farmer to produce more products than his market will absorb. That, however, is no reason why he should not use fertilizers. If by feeding his soil liberally he can produce corn or oats at a lower cost per bushel, there is even more reason for feeding it liberally when corn or oat prices are low than when they are high. The trouble with our correspondent's way of looking at his business is that he labors under the erroneous conception that efficient production necessarily means the production of a surplus.

"One might as well say that since butterfat prices are low high producing cows are not as desirable as low producers. Or that one should cut down the amount of high protein feed in the ration of a dairy cow when milk prices are low. That sort of reasoning is not likely to lead to profits. If a man

wants to raise 2,000 bushels of corn, he will obtain a larger profit if he grows that amount on 40 acres than if he devotes 50 acres to the project. If by the use of fertilizer he can raise the required amount of corn on 20 per cent less ground and do it at a lower cost per bushel, why should he not be anxious to do that? Let him use the land saved by this system for pasture or for some other crop, of which there is no present surplus—alfalfa hay, for example. Few Wisconsin farmers have too much pasture or too much legume hay.

"Our correspondent quotes Mr. Denman, Federal Farm Board member, as having said: 'I am not interested in how much I produce, but how much I get for what I do produce.' That statement, taken away from other supporting statements which the speaker undoubtedly made, only gives part of the truth. For the farmer is, or should be, interested in more than price; production cost is equally important. Cost of production can to a certain extent be controlled by the individual farmer; price never.

"Let us as farmers never lose sight of the fact that whenever we cut the cost of producing our products we take a step toward larger profits. Let us keep the surplus problem distinct from unit cost of production."

Our County Agent

A county agent and his job are often discussed. They are criticized and praised. It seems to us that Albert Hines of Bedford county, Tennessee, in a letter published in the Extension Division News of the Virginia Polytechnic Institute has set forth some sound replies to unfounded criticisms.

Mr. Hines says:

"Our County Agent—

Is simply our hired man, yet to hear some folks talk one would think he is our boss.

Is not a magician, he cannot, by waving a wand, raise the price of corn.

Does not claim to know it all.

Has no cure-all for farm ills.

Is always on the job.

Cannot make any farmer prosperous over night.

Cannot help if you do not give him a chance.

Does not come on the farm to tell you what to do, but to discuss your problems.

Wears a collar and tie, because it is standard equipment. How would he look in overalls, hickory shirt, and brogan shoes?

Has an orderly, well-arranged office where the farmers can meet and discuss their problems.

Welcomes sincere criticism.

Is a human being. After doing his best he does not like to be kicked.

Hauls his moving picture machine about over the country, showing us interesting pictures of farm life.

Promotes boys' and girls' clubs, and thus keeps them interested in farming. This alone is worth what he costs us.

Has to have a salary, else how could he live?

Cannot give lectures that will keep the weeds down, or the fences up.

Believes in a better agriculture."

The Toxicity *of* Certain Fertilizers

By Professor A. Bruno

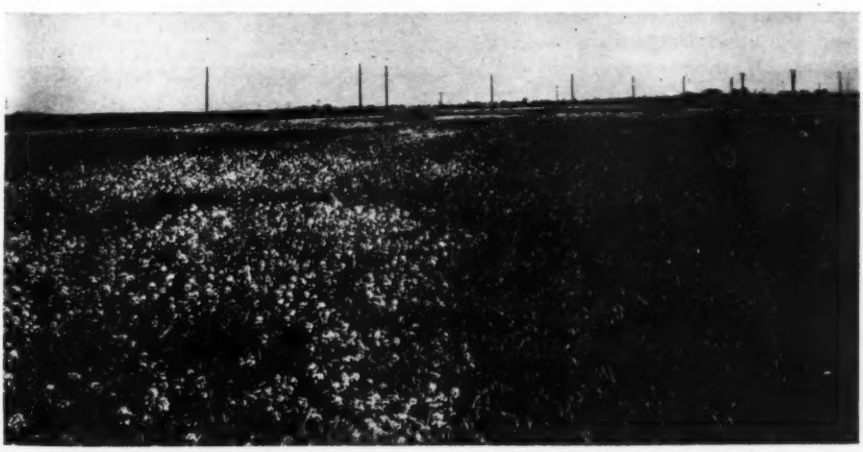
Formerly Director of Agronomic Stations, Paris, France

Translation by H. E. LeFevre, Montreal, Canada

IT has long been known that certain fertilizers are likely to have a toxic action on plants at the time of application.

This toxicity can be due to the product itself or else be caused by a small variable proportion of highly toxic components as sulfo-cyanides in some cyano derivatives of calcium cyanamide. This has made it necessary to exercise a very strict chemical control of nitrate of soda, which must be practically, if not absolutely, free from perchlorides, chlorates, and periodates. It is likewise necessary to watch closely the purification of potassium salts extracted from salt lakes on account of their borax content.

Toxicity can be practically permanent, disappearing only slightly through leaching. It can be temporary and more or less rapidly destroyed by contact with the soil through bacterial or chemical actions: oxidations, reductions, neutralizations, precipitations. One of the most interesting of bacterial actions is the destruction of phenolic components.



Finely ground kainit killed the charlock (wild mustard) at the right in this field of barley in France.

It is obvious that the poisoning effect depends upon the concentration. When in a very weak solution toxic products can prove beneficial, and on the contrary when too concentrated, the best fertilizing salts can kill plants.

Without going into great detail as to the mechanism of toxicity, it is necessary to point out that very often death results from the suspension of some essential biological function. The destruction of matter through chemical reaction is not necessary, and very often injury results from a plasmolytic action or from dessication of the superficial cells.

Plant Resistance Varies

Plant resistance to toxic products varies greatly according to species, variety, and age; for instance, young seedlings just after germination are particularly sensitive to all kinds of toxicity. This is why it is possible to top-dress well-started crops with nitrate of soda or muriate of potash with very good results, while a top-dressing with the same materials at planting time or immediately after germination would have detrimental effects.

Physical features of plants are no less important. Whether leaves are carried horizontally or almost vertically; whether aerial organs are more or less hairy or quite smooth; whether the epidermis is thin and absorbs moisture easily or on the contrary is thick and almost impervious due to a waxy cuticle; all these are most obvious and generally recognized reasons why the same treatment will seriously injure certain plants without proving detrimental to other species in the same plot.

A careful observation of a certain crop will show in the course of its development an uneven aptitude to be moistened by a given solution. For instance, plants of the squash family have flowers very sensitive to chemical reagents which greatly contrast with their rough, coarse foliage. Therefore, considerations of a strictly chemical order are often not sufficient to the understanding of the mechanism of some selective actions, and many times it is in the morphology of the plants and the physical processes of the action that the explanation is to be found.

It is clear that if a drop of a toxic solution strongly adheres to a leaf and spreads there, it will have the maximum action, while on the contrary the same drop keeping a spheric shape and in some way rolling on the surface of the plant will fall to the ground at the slightest wind practically without having any detrimental effect. This consideration is essential in the preparation of all chemical solutions used to fight the diseases or parasites of plants.

In vineyard sections much attention has been devoted to the possibility of improving the moistening and adhering qualities of copper mixtures; this is mostly a question of surface tension.

Practical Results Obtained

The deep knowledge which we have of such detrimental effects enables us to obtain very interesting results. It is possible, through the proper treatment of a mixed planted area, to destroy certain species and spare those that are useful. An example of this is the destruction in grain fields of wild mustard and other weeds by sulphuric acid, according to Mr. Rabate's well-known method. It is also well known that kainit solutions or finely ground kainit are used for the same purpose in grain or beet fields.

This finely ground kainit, applied early in the morning at the rate of 800 to 1,000 lbs. per acre on a grain field infested with wild mustard, charlock, and wild vetch, gives remarkable results, destroying most of the noxious species, while increasing the vigor of the oats or wheat. Likewise copper sulphate is used to destroy weeds in potato fields.

Compound mixtures have been used that contain a toxic product, chlorate, perchlorate, or copper salt, mixed with

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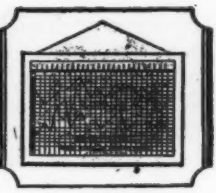
AGRICULTURAL DEVELOPMENTS



RICH SOIL PROTECTS CORN AGAINST FROSTS

Just as a well-fed man is better able to withstand the rigors of cold weather, so corn which has received an abundance of plant food is better able than poorly nourished corn to withstand frost attacks, both in the late spring and early fall, agronomists of the United States Department of Agriculture have found.

Department plant breeders studied the question at Bloomington, Ill., in the Corn Belt during the last three years. They produced frost with a portable refrigeration plant which was used in different parts of the corn plots.

The results of the experiments suggest that farmers may minimize or avoid frost danger to their corn by growing it in fields that have been fertilized or are naturally rich in plant food.

Corn was planted in 1930 on land plowed from virgin sod in the fall of 1929 and also on soil which had been plowed from virgin sod in 1921 and cropped continuously since. Corn grown on the "new" ground was much more resistant to the frost than that grown on the older land.

While testing corn on cropped and on new soil, the agronomists also experimented with fertilizer in varying amounts on the old soil. Plants growing in fertilized soil showed more resistance to frost than those growing in untreated soil. Young plants of a cold-susceptible strain in untreated soil were killed in a few minutes at a temperature of 33 deg. to 34 deg. F. whereas plants of the same strain grown in a fertilized hill showed no ill effect from four hours of exposure to a 30 deg. temperature.

Fall tests gave much the same results. In one instance, approximately 50 plants were subjected to a temperature of 26 deg. to 27 deg. for two hours. Half of them were on fair soil and the remainder on soil capable of producing 15 bushels more to the acre. The test was made about the middle of September when the kernels were about four-fifths matured. Following exposure to the cold, neither set of plants showed any noticeable injury. When the crop was ripe, however the corn on the poorer soil had failed to mature completely, while that on the richer soil had matured naturally and fully.

DEPARTMENT'S SOYBEANS TURNED UNDER TO PREPARE FOR NEW LAWN

The soybeans which made a luxuriant growth in front of the main building of the U. S. Department of Agriculture, Washington, D. C., from May until August were disked into the soil the first week in August, about a month before the pods would naturally appear. The ground is now being plowed and will be thoroughly disked and harrowed, thus bringing to a close the second stage of a new lawn which, running from Twelfth to Fourteenth Street SW. will cover the site of the old buildings demolished last year. The strip between the wings and the new road is being prepared by being heavily fertilized with manure from the Beltsville, Md. experiment farms. The manure is to be thoroughly disked into the soil, after which the entire area will be harrowed and rolled into good condition for seeding. A further ap-

plication of fertilizer—850 pounds of superphosphate, 250 pounds of muriate of potash, and 125 pounds of nitrate of soda per acre—will be applied to the entire area just in advance of seeding. There are approximately 4 acres in the area to be seeded this fall.

A mixture of 90 pounds of Kentucky bluegrass, 90 pounds of Chewing fescue, and 20 pounds of Colonial bent grass per acre will be sown early in September.—*The Official Record, August* 15, 1931.

WHAT IS NATION'S MOST IMPORTANT CASH CROP?

Probably many people believe that wheat is the most important cash crop grown in the United States. They will be surprised to know that wheat takes the place down the line when cash crops are ranked in the order of their importance.

Cotton is king; milk ranks second; hogs third; then come cattle and calves, eggs and chickens, and finally, wheat.

"HAND - RAISED" PARASITES TO DESTROY RANGE PESTS

Millions of small wasplike insects are now being liberated on the cattle ranges of the Southwest to destroy the eggs of the range caterpillar, a pest which, after having been comparatively inactive there for 10 years, threatens to eat up all the range grass over a wide area.

In the 1914 outbreak nature provided the parasites to control the range pest. This year entomologists of the United States Department of Agriculture are providing them to help nature renew the supply that has almost entirely disappeared from the region.

To be ready for the coming of the caterpillars, Government entomologists through the winter produced the parasites at the rate of 60,000 a day and placed them in cold storage at the Temple, Arizona, field station. The vast insect army is now being deployed over the grazing grounds where the range caterpillar is present in the egg stage in large numbers. The tiny parasites will at once attack the caterpillar eggs and, it is hoped, quickly reduce the number of caterpillars to normal.

Similar parasites are being tried out against many insect pests, including the alfalfa weevil, coddling moth, oriental fruit worm, and the corn borer, but this is the first time they have been tried on a large scale against the range caterpillar.

"Range caterpillars," says Dr. W. H. Larrimer, in charge of the Department of Agriculture's work on cereal and forage insects, "are such greedy and wasteful feeders that sometimes they seem to eat from habit rather than from hunger. They destroy the range not only by chewing the grass down to the roots, but also by covering any uneaten blades with shed skins and poisonous spines, thus spoiling the pasture for the stock. Recently this pest, long familiar on ranges and pastures, has added cultivated crops to its diet."

JUST WHAT IS A FARM

Ottawa, Canada.—There may be many persons in Canada who are farmers according to the Canadian Government's official definition as to what constitutes a farm for the purpose of the census and don't know it. The census officials define a farm as "a tract of land of one acre or over which produced in 1930 crops of any kind to the value of $50 or more, or which is in crop or being used for pasture during the present year."

Just how many farmers there are in Canada on this basis remains to be disclosed by the figures collected when the decennial census was taken last June, but they will probably number close to one million. Ten years ago the total was 711,090 and this figure does not include over 30,000 units of land less than one acre producing crops of some value.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

To commemorate the "Fiftieth Anniversary of the General Fertilizer Tests" at the Pennsylvania Station, Bulletin 264 of that name has been prepared by C. F. Noll, F. D. Gardner, and C. J. Irwin. In this, 49 years' results with various plots continuously treated over this period were summarized. It is natural in experiments continued over so long a period of time that many interesting facts should develop. The soil on which these plots are located is naturally fertile and rather heavy. Plots that have not received any fertilizer or other treatment for 50 years are still producing 19 bushels of corn, 7 bushels of wheat, and 1,200 lbs. of hay to the acre, which speaks well for the natural fertility of the soil. The experiment is planned in such a way as to show the value of manure, lime, various kinds and amounts of nitrogen and phosphoric acid carriers, and the use of potash, singly and in combination.

The results show that none of the materials alone were as profitable as combinations of them. The most profitable treatments were those combining lime, nitrogen, phosphoric acid, and potash; or lime, phosphoric acid, and potash; or manure and lime. The experiment brings out clearly that just as high yields can be obtained without as with manure if proper lime and fertilizer treatments are used, even over a long period of time. Work of this nature is very important in showing farmers the best systems of soil management to be followed in maintaining a permanent agriculture.

A number of fertilizer control reports issued recently show interesting trends in the analysis and price of fertilizers. In Bulletin 517 of the New Jersey Agricultural Experiment Station by C. H. Cathcart, entitled "Analysis of Commercial Fertilizers and Ground Bone; Analysis of Agricultural Lime, 1930," the author shows that the average analysis of complete fertilizers sold in New Jersey in 1921 was 2.46-8.49-4.26 (NPK) with an average price of $54.10 per ton. In 1930 the average analysis was 3.53-8.81-6.65, with an average price of $35.50 per ton. Thus the average fertilizer contained 3.78 units more plant food and sold for $18.60 per ton less.

Bulletin 320 of the Vermont Station by L. S. Walker and E. F. Boyce, "Commercial Fertilizers" gives a table showing that in 1921 the average composition of fertilizers sold in Vermont was about 2.2-8.2-3.2 with an average price of $48 per ton while in 1930 it was 3.8-10-6.8 with an average price of $44 per ton. Here again an increased amount of plant food sold for less money.

Other interesting data are contained in the 1930 Report of the Ohio Department of Agriculture, Division of Feeds and Fertilizers by B. D. Leis. Here it is shown that the amount of plant food in fertilizer has increased markedly in Ohio from 1924 to 1930.

It is encouraging to note the increased interest in the trends in fer-

tilizer usage as shown by the summaries included in many State control reports. Instead of being a mere collection of analyses many reports now analyze the data and compile tables summarizing the analyses. This work greatly increases the value of the control reports and is of great use to all interested in fertilizers. This practice is most highly to be commended.

The interesting possibilities of fertilizer control reports, which may look rather dull and uninteresting on the surface, have been recognized by Director J. L. Hills and he has prepared a bulletin discussing fertilizer control work, "A Half Century of Fertilizer Control in Vermont," Vermont Agricultural Experiment Station, Bulletin 323. In this the author says a few words regarding the early history of fertilizers in the United States and the beginnings of fertilizer control work. Changes in usage, trade practices, analyses, brand names, and costs are discussed and appropriate tables and examples are used to illustrate the points under consideration. Altogether the bulletin makes highly instructive and interesting reading.

"Commercial Fertilizers," Ga. Dept. of Agr., Atlanta, Ga., Serial No. 118, Dec., 1930.

"Fertilizer Grades and Formulas," N. H. Ext. Service, Durham, N. H., Ext. Cir. 123, Mar., 1931, F. W. Taylor.

"Investigations Relative to the Use of Nitrogenous Plant-Foods, 1913-1927," Agr. Exp. Sta., New Brunswick, N. J., Bul. 519, Mar., 1931, J. G. Lipman, A. W. Blair, and A. L. Prince.

"Report of Analyses of Commercial Fertilizers Sold in New York State July 1, 1929, to June 30, 1930," Dept. of Agr., Albany, N. Y., Bul. 247, Feb., 1931.

"Fertilizer Tests of Several Soil Types," Agr. Exp. Sta., Ithaca, N. Y., Bul. 520, Apr., 1931, T. L. Lyon.

"Report of Analyses of Samples of Lime Materials Used For Agricultural Purposes Sold in New York State July 1, 1929, to June 30, 1930," Dept. of Agr., Albany, N. Y., Bul. 246, Jan., 1931.

Soils

The drainage or lysimeter tanks at Cornell University have become justly famous both from their age and from the valuable information they have furnished. Rather heavy soils have been placed carefully in these tanks as nearly as possible in their original condition and variously cropped and fertilized. The crops are measured both by yields and analysis and all drainage water is collected and analyzed. A report of this work has just been published in Cornell University Memoir 134, entitled Lysimeter Experiments—III by T. L. Lyon, J. A. Bizzell, B. D. Wilson, and E. W. Leland. It is possible here to give only a general idea of the many relationships discussed in this bulletin.

Two rotations of corn, oats, wheat, and hay were used, one with legumes and one without. The rotation including legumes gave the highest total yields. Liming increased the yields in the legume rotation but tended to decrease yields in the non-legume rotation. When the soil was not cropped about two-thirds of the rainfall percolated through the soil while only one-half percolated through the cropped soil. Liming had little influence on percolation. Lime was lost from the soil by leaching more than any other substance although relatively small amounts were removed in the crops. Liming the soil had little influence on the lime removed in crops or drainage water. Magnesium was removed from the soil by leaching and crops in much smaller quantities than lime.

Phosphorus was not leached to any practical extent, total removal being in the crops. The crop removal ranged from a little less than 11 to almost 20 lbs. per acre per year on the average, depending on the crops grown. The rotation including legumes removed more phosphorus than the rotation without legumes. Liming tended to increase the phosphorus removed by crops.

Potash leached in only moderate quantities from the soil, more being removed by the crop than by drainage. The total amount of actual potash removed by crops and drainage averaged around 150 lbs. per acre per year. Liming had little influence on potash

removal but apparently tended to reduce it if anything. Adding potash to the soil did not greatly influence the amount removed by crops or drainage.

Sulphur was lost from the soil mainly by drainage, comparatively small amounts being contained in the crop.

Nitrogen was continually being lost from the soil in the crop and drainage water. The smallest loss was where grass was grown and the largest where a legume rotation was grown or no crop at all. Since the legume probably obtained considerable nitrogen from the air, the uncropped soils probably suffered the greatest actual loss of nitrogen.

Cropping the soil reduced the leaching of all nutrients and in some cases the combined removal of a substance by both crop and drainage was less than the leaching on the fallow soil. This shows very strikingly the importance of cover crops in humid sections.

While this bulletin is technical in its nature many important and highly practical conclusions on soil management can be drawn from the material contained in it.

"Crop Yields From Illinois Soil Experiment Fields in 1930," *Agr. Exp. Sta., Urbana, Ill., Bul.* 370, *May*, 1931, *F. C. Bauer.*

"Soils of Hill County," Agr. Exp. Sta., Bozeman, Mont., Bul. 246, *May*, 1931, *L. F. Gieseker.*

"Land Survey of the Town of Durham, New Hampshire," Agr. Exp. Sta., Durham, N. H., Bul. 255, *Mar.*, 1931, *C. E. Walker.*

"Report of the Division of Soils and Crops for the Year Ending June 30, 1930," *Agr. Exp. Sta., New Brunswick, N. J., Jacob G. Lipman, Augustine W. Blair, and Howard B. Sprague.*

"Alkali Soils and Their Management," Agr. Ext. Service, State College, N. M., Ext. Cir. 105, *Feb.*, 1931, *Albert S. Curry.*

"Determination of Soil Moisture by the Method of Multiple Electrodes," Agr. Exp. Sta., College Station, Tex., Bul. 426, *Apr.*, 1931, *W. H. McCorkle.*

"Soil Survey of Lyon County, Iowa," U. S. D. A., Washington, D. C., Series 1927, *No.* 11, *A. M. O'Neal, D. S. Gray, H. M. Smith, and R. E. Deverenx.*

"Soil Survey of Crawford County, Kansas," U. S. D. A., Washington, D. C., Series 1928, *No.* 3, *M. H. Layton, J. A. Kerr, E. W. Knobel, H. W. Higbee, and R. W. O'Hara.*

"Soil Survey of St. Lawrence County, New York," U. S. D. A., Washington, D. C., Series 1925, *No.* 34, *Clarence Lounsbury, H. G. Lewis, F. B. Howe, and Salvador Diadato.*

Crops

The very important influence that fertilizers may have upon the quality of a crop is very strongly brought out in a new technical bulletin, No. 176, "Factors Affecting the Quality of Commercial Canning Peas," published by the New York State Agricultural Experiment Station, Geneva, N. Y. The authors, C. B. Sayre, J. J. Willaman, and Z. I. Kertesz, report in concise manner the experiments conducted to determine what chemical changes in peas are associated with quality of the canned product. Tenderness was the principal quality factor studied and in this connection the authors sought to determine the particular effect of fertilizers upon this quality.

Among the interesting facts brought out by the experiments is that as the potassium content of peas increases the calcium content decreases. Higher calcium content is always associated with tougher peas. The harder peas had a higher lime content of the skins. Another surprising fact developed was that while an abundant supply of potassium in the fertilizer made thicker skins on the peas, these peas were more tender than in cases where a deficiency of potassium caused thinner skins. The thicker seed coats were not tougher, but actually had a lower puncture value than the thinner skins.

In drawing their conclusions the authors make the following statements:

"With a soil and climate generally suited to peas, the grower can fertilize for quantity, and the quality will take care of itself. However, from the standpoint of quality, it would be a safe precaution to have abundant available potassium present, as this would tend to lessen the absorption of calcium. No difference could be detected between the chloride and the sulfate

in potassium fertilizers in their effect on quality peas, but the chloride form of calcium distinctly made harder peas."

"The Peanut Crop in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 263, June, 1931, C. K. McClelland.

"Preliminary report on Cultural and Fertilizer Experiments with Rice in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 264, June, 1931, Martin Nelson.

"The Control of Weeds," Agr. Exp. Sta., Berkeley, Cal., Cir. 54, June, 1931, W. S. Ball, B. A. Madson, and W. W. Robbins.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XX, No. 5, May, 1931.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XX, No. 6, June, 1931.

"Citrus Propagation," Agr. Exp. Sta., Gainesville, Fla., Bul. 227, Apr., 1931, A. F. Camp.

"More and Better Potatoes," Purdue Univ., Lafayette, Ind., Ext. Bul. 89, May, 1931, W. B. Ward, C. T. Gregory, and H. K. Riley.

"The Effect of Various Containers on the Growth of Vegetable Plants," Agr. Exp Sta., Ames, Iowa, Bul. 279, May, 1931, E. S. Haber.

"The Vegetable Garden," Univ. of Ky., Lexington, Ky., Cir., 243, March, 1931, John S. Gardner.

"Agricultural and Rural Home Program for Maryland—1931-1936," Univ. of Md., College Park, Md., Cir. 86, April, 1931.

"A Production and Economic Survey of the Black Raspberry Industry of Washington County, Maryland," Univ. of Md., College Park, Md., Bul. 322, August, 1930, Hugh Ross and E. C. Auchter.

"Maryland Grasses," Univ. of Md., College Park, Md., Bul. 323, Sept., 1930, J. B. S. Norton.

"The Forty-Third Annual Report of the University of Maryland, 1929-1930," Agr. Exp. Sta., College Park, Md.

"Facts on Lawn Management," Massachusetts Agricultural College, Amherst, Mass., Ext. Leaf. 85, April, 1931, L. S. Dickinson.

"How to Grow Sweet Corn," Massachusetts State College, Amherst, Mass., Ext. Leaf. 102, April, 1931, Paul W. Dempsey.

"The New Ten Year Program for Massachusetts Fruitmen," Mass. State College, Amherst, Mass., Ext. Leaf. 114, April, 1931.

"The Identification of Apple Varieties from Non-Bearing Trees," Agr. Exp. Sta., Amherst, Mass., Bul. 274, April, 1931, J. K. Shaw and A. P. French.

"Producing Beans in Michigan," State College of Agr., East Lansing, Mich., Ext. Bul. 116, April, 1931, H. R. Pettigrove and C. R. Oviatt.

"Emergency Hay and Pasture Crops, Agr. Exp. Sta., East Lansing, Mich., Special Bul. 150, March, 1931, C. R. Megee.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VIII, No. 7, July, 1931.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., Vol. VIII, No. 8, August, 1931.

"Cotton Production in Missouri," Agr. Exp. Sta., Columbia, Mo., Bul. 299, March, 1931, B. M. King.

"Irrigated Alfalfa in Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 245, May, 1931, J. E. Norton.

"The Northern New Hampshire Farm Woodlot," Univ. of New Hampshire, Durham, N. H., Ext. Bul. 37, Dec., 1930, C. S. Herr.

"Extension Work, 1930," Univ. of New Hampshire, Durham, N. H., Ext. Bul. 38, March, 1931, J. C. Kendall.

"Agricultural Research in New Hampshire," Univ. of New Hampshire, Durham, N. H., Bul. 256, April, 1931, J. C. Kendall.

"New Jersey Canhouse Tomato Production—Recommendations for 1931," Agr. Exp. Sta., New Brunswick, N. J., Ext. Bul. 86, March, 1931, Charles H. Nissley.

"Blueberry Culture," Agr. Exp. Sta., New Brunswick, N. J., Cir. 229, April, 1931, Charles S. Beckwith and Stanley Coville.

"Winter Injury of Evergreens," Agr. Exp. Sta., New Brunswick, N. J., Cir. 245, April, 1931, Richard P. White.

"Cranberry Growing in New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 246, March, 1931, Charles S. Beckwith.

"Premature Heading of Cauliflower as Associated with the Chemical Composition of the Plant," Agr. Exp. Sta., New Brunswick, N. J., Bul. 509, Jan., 1931, W. R. Robbins, G. T. Nightingale, and L. G. Schermerhorn.

"Length of the Fruit Development Period of the Elberta and Some Other Varieties of Peaches," Agr. Exp. Sta., New Brunswick, N. J., Bul. 511, Oct., 1930, M. A. Blake.

"Early Grano Onion Culture," Agr. Exp. Sta., State College, N. M., Bul. 193, April, 1931, Fabian Garcia and A. B. Fite.

"Seventy-Six Clover Questions Answered," State College of Agriculture, Ithaca, N. Y., Bul. 210, April, 1931, H. B. Hartwig.

"Celery Production on the Muck Soils of New York," Agr. Exp. Sta., Ithaca, N. Y., Bul. 517, March, 1931, J. E. Knott.

"Cultivation Experiments with Certain Vegetable Crops on Long Island," Agr. Exp. Sta., Ithaca, N. Y., Bul. 521, April 1931, H. C. Thompson, P. H. Wessels, and H. S. Mills.

"A Gene in Maize for Supernumerary Cell Divisions Following Meiosis," Agr. Exp. Sta., Ithaca, N. Y., Memoir 135, March, 1931, G. W. Beadle.

"Winter Hay Crops," State College of Agr., Raleigh, N. C., Ext. Cir. 187, June, 1931, E. C. Blair.

"Crop Rotations for Piedmont North Carolina," State College of Agr., Raleigh, N. C., Ext. Cir. 188, June, 1931, E. C. Blair.

"Lumber Production in Ohio," Agr. Exp. Sta., Wooster, O., Bul. 478, June, 1931, R. R. Paton and J. S. Houser.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, O., No. 151, July-Aug., 1931.

"Preliminary Report on Effect of Irrigation on Major Berry Crops in the Willamette Valley," Agr. Exp. Sta., Corvallis, Ore., Bul. 277, May, 1931, C. E. Schuster, R. S. Besse, G. L. Rygg, and W. L. Powers.

"The 'Frozen-Pack' Method of Preserving Berries," Agr. Exp. Sta., Corvallis, Ore., Bul. 278, May, 1931, Ernest T. Wiegand.

"A Method for Studying Water Conduction in Plants in Relation to Pruning, Grafting, and Other Horticultural Practices,' Agr. Exp. Sta., Corvallis, Ore., Bul. 279, May, 1931, E. M. Harvey.

"A Preliminary Report on the Vegetative Growth of Okra (Hibiscus esculentus Linn.) in Relation to the Production of Varying Amounts of Reproductive Tissue," Agr. Exp. Sta., Corvallis, Ore., Bul. 284, June, 1931, E. M. Harvey.

"Oats Production in Western Oregon," Agr. Exp. Sta., Corvallis, Ore., Bul. 285, June, 1931, D. D. Hill.

"Spinach in Texas," A. and M. College, College Station, Tex., Cir. 84, April, 1931, J. F. Rosborough.

"Watermelon Demonstration," A. and M. College, College Station, Tex., Cir. 87, March, 1931, R. R. Reppert.

"Twenty Years of Rotation and Manuring Experiments at Logan, Utah," Agr. Exp. Sta., Logan, Utah, Bul. 228, June, 1931, George Stewart and D. W. Pittman.

"San Juan County Experimental Farm Progress Report, 1925-30, Inclusive," Agr. Exp. Sta., Logan, Utah, Bul. 230, June, 1931, James H. Eagar and A. F. Bracken.

"Forty-Third Annual Report, 1929-1930," Agr. Exp. Sta., Burlington, Vt., Bul. 319, July, 1930, J. L. Hills.

"Agricultural Seed," "Fifteen Years of Agricultural Seed Inspection," Agr. Exp. Sta., Burlington, Vt., Bul. 322, Nov., 1930, Anna S. Lutman and J. L. Hills.

"Department of Agriculture Immigation," Richmond, Va., Bul. 283, July, 1931.

"Moss Peat, Its Uses and Distribution in the United States," U. S. D. A., Washington, D. C., Cir. 167, June, 1931, A. P. Dachnowski-Stokes.

Economics

A new bulletin of very timely interest is "Influence of Yield on Cost and Income in Agricultural Production," Bulletin 297 of the Missouri Agricultural Experiment Station. The author, Economist Ben H. Frame, introduces his subject by saying:

"Prices of many farm products at the present time are lower than they have been for many years. Apparently there is a larger supply of these than the consuming public is willing or able to buy at prices which are remunerative to many of the growers. At the time that the prices of farm products are so low, millions of people in our cities and in foreign countries are hungry. In view of such conditions many farmers are wondering how best to meet the situation."

In his discussion which follows he offers the opinion that the colleges of agriculture and extension agents, by making knowledge of more efficient practices of production and marketing available to all, are offering the best solution of the farmers' problems. While he recognizes that the lower the price of the product, the lower is the intensive margin of production, a point closely associated with the law of diminishing returns, he points out that the law of diminishing returns operates only after a certain point has been reached. He believes that on many Missouri farms the point of diminishing returns has not yet been reached. If this is true, the surest and quickest way of individual farmers to increase their efficiency of production and improve their financial status is to increase their yield per acre and per animal.

Many other phases of the present situation are discussed in this bulletin, which should find a wide range of interest at this time.

"Three-Year Study of Farm Management and Incomes in a Typical Upland Section of Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 262, May, 1931, J. A. Dickey.

"Economic Digest," Conn. Agr. College, Storrs, Conn., Bul. 24, June, 1931, G. B. Clarke.

"Retail Credit in Iowa Farmers' Elevators," Agr. Exp. Sta., Ames, Iowa, Bul. 283, June, 1931, Frank Robotka.

"Factors Affecting Sweet Potato Prices in Missouri," Agr. Exp. Sta., Columbia, Mo., Bul. 302, Apr., 1931, F. L. Thomsen and W. R. Fankhanel.

"Variations in Local Prices for Farm Products and Supplies in Missouri," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 151, Nov., 1930, F. L. Thomsen.

"A Statistical Study of Milk Production for the New York Market," Agr. Exp. Sta., Ithaca, N. Y., Bul. 518, Apr., 1931, M. P. Catherwood.

"Farm Economics," State College of Agr., Ithaca, N. Y., No. 71, June, 1931, E. G. Misner.

"The North Dakota Farm Outlook," N. D. Agr. College, Fargo, N. D., Vol. VI, No. 10, July 22, 1931, Rex E. Willard and F. H. Turner.

"Type of Farming Areas in Texas," Agr. Exp. Sta., College Station, Tex., Bul. 427, May, 1931, C. A. Bonnen and F. F. Elliott.

"Virginia Farm Statistics, 1930," Va. Dept. of Agr., Richmond, Va., John A. Hicks.

"Directors of Farm Cooperatives—Their Duties and Responsibilities," College of Agr., Madison, Wis., Cir. 245, June, 1931, H. H. Bakken.

"Iowa Monthly Crop Report, June 1, 1931," Iowa Dept. of Agr., Ames, Iowa.

Diseases

"Diseases of Watermelons in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 225, Feb., 1931, M. N. Walker and George F. Weber.

"A Preliminary Report on Anjou Scald and Its Control," Agr. Exp. Sta., Corvallis, Ore., Bul. 280, June, 1931, Henry Hartman.

"Varietal Resistance, Physiologic Specialization, and Inheritance Studies in Bunt of Wheat" Agr. Exp. Sta., Corvallis, Ore., Bul. 281, June, 1931, E. N. Bressman.

"The Rots of Washington Apples in Cold Storage," Agr. Exp. Sta., Pullman, Wash., Bul. 253, May, 1931, F. D. Heald and G. D. Rueble.

The Dutch Elm Disease, U. S. D. A., Washington, D. C., Cir. 170, May, 1931, Curtis May and G. F. Gravatt.

Insects

"1931 Spray Schedule for Peaches," Agr. Exp. Sta., New Brunswick, N. J., Cir. 222, Feb., 1931, T. J. Headlee, W. H. Martin, and A. J. Farley.

"1931 Spray Schedule for Pears," Agr. Exp. Sta., New Brunswick, N. J., Cir. 223, Feb., 1931.

"1931 Spray Schedule for Grapes," Agr. Exp. Sta., New Brunswick, N. J., Cir. 224, Feb., 1931.

"1931 Spraying Recommendations for Apples," Agr. Exp. Sta., New Brunswick, N. J., Cir. 227, Feb., 1931.

"1931 Spray Schedule for Plums and Cherries," Agr. Exp. Sta., Cir. 228, Feb., 1931.

"Spraying and Dusting Experiments with Potatoes on Long Island," Agr. Exp. Sta., Geneva, N. Y., Bul. 592, Feb., 1931, H. C. Huckett.

"Oil Sprays for Summer Use," Agr. Exp. Sta., Pullman, Wash., Bul. 252, May, 1931. Anthony Spuler, F. L. Overley, and E. L. Green.

"Fig Insects in California," U. S. D. A., Washington, D. C., Cir. 137, Apr., 1931, Perez Simmons, W. D. Reed, and E. A. M'Gregor.

"Conserving Corn from Weevils," U. S. D. A., Washington, D. C., Bul. 1029, May, 1931. E. A. Black.

Liming Costs and Benefits

(*From page* 30)

years? While but little authentic information on this subject is available, several instances of actual farm experience tend to throw some light on the matter. Take for instance the following example

In 1917 Mack Bradley, a Missouri farmer, limed a field for alfalfa, using 2.5 tons of ground limestone per acre. This field was in alfalfa for six years. It was then plowed up and cropped with corn for three years, and then seeded to alfalfa again. At the end of 12 years soil from spots where the alfalfa was failing was tested and showed a lime requirement of 1.5 tons per acre. In this case that land was in alfalfa—a heavy lime consuming crop —for nine out of 12 years, and there was every indication that the soil was still "sweet" when the field was sown to alfalfa the second time, nine years after liming.

In Bradley's case the cost of lime applied was $5 per acre. Assuming that this application of 2.5 tons per acre had a maximum effectiveness for six years, his prorated annual cost was but 84 cents per care. On the same basis the 31 farms from which liming costs were obtained had annual costs ranging from about 50 cents to $1.30 per acre.

These costs are rather insignificant when the benefits received are considered,

Waste By-Products Become Dairy Feed After University of California Trials

Davis, Aug. 20.—By-products that have not only been wasted but which have caused losses because of the cost of disposing of them have been turned to profit as dairy feed following trials made by the University of California animal husbandry division at the Branch of the College of Agriculture here. A specific example is given by Prof. W. M. Regan in orange pulp, which formerly cost growers about $2 a ton to destroy; now it is worth from $40— to $60 a ton as feed for dairy cows.

Other feeds that have been found to have a value as stock feed are pineapple pulp, raisin pulp, stemmer pulp from raisins, sesame meal, artichoke silage, waste spinach, etc. Studies of such feeds are made as money becomes available, under the direction of Arthur Folger, supervisor of advanced registry tests for California.

"The use of these by-products as feed not only opens a source of revenue for the producers of crops, but also makes available valuable feeds for the dairyman at costs usually lower than others in use. At any rate, the tests made in this division, both of nutritive values, digestibility and palatability, give data upon which prices can be made with fairness to both producer and user of the feed."

More Food for Potatoes

(*From page 25*)

ash and that the ratio of potash to nitrogen and phosphoric acid in a 5-8-7 analysis was not suitable for the best results.

More recently the Maine Experiment Station showed that in cropping a section of a field with hay for seven consecutive years so as to get all plots on a uniform fertility basis, potash had been depleted more than nitrogen and phosphoric acid.

Foremost among the farmers who held this contention were Arthur A. Ginn and Edgar Russ, of Caribou, Maine, prominent growers and shippers of potatoes. Mr. Ginn stated that "one couldn't see the difference from the road, but when one got into them, invariably the tops were more stalky, remained green longer, and dug measured from 15 to 20 barrels more to the acre when grown on 5-8-10 then when grown on 5-8-7." The rate of application was 2,400 pounds per acre.

Mr. Russ asserted, "I do not remember ever checking the yield differences, but I have never felt that I could sell as many potatoes grown on 5-8-7 as when grown on 5-8-10," meaning that they graded better.

Thirteen farm tests have been made during the past three seasons to check these opinions, and the average results showed a difference of 16.3 barrels (44 bushels) increase in yield per acre from the use of 10 per cent potash over 7 per cent potash with the rate of application of fertilizers being the same—2,300 pounds. On a graded U. S. Number 1 basis the difference in yield was 20.4 barrels (56 bushels). This is a gain of 4.1 barrels per acre over the total yield difference per acre, all of which lends strength to Mr. Ginn's and Mr. Russ' assertions. Invariably the tubers were more blocky in shape, of better type, and there were fewer pointed-tipped ones noticed when grown on the high potash fertilizer.

An indication of the trend towards

higher potash fertilizers is revealed by the change in analyses sold now and two years ago. One of the concentrated dry mixers sold 98 per cent of his fertilizer in the form of 10-16-14 then. In 1931 he estimated that it would run 80 per cent 10-16-20 and his total tonnage is increasing each year. One of the old-line companies' output was practically all 5-8-7 two years ago. In 1931 it was figured to run close to 50 per cent 5-8-10. Equally as abrupt changes are being made by other fertilizer companies.

It is the big yields of high quality, merchantable potatoes that determine profit in any competing potato section. High rate of application of fertilizers carrying an abundance of potash appears to be playing an important role in Aroostook county in accomplishing this.

Better Pastures for Western Washington

(*From page* 10)

days for the fertilized plots and 181.6 for the check plot, or a difference of 29 days in favor of the fertilized plots.

An interesting observation in connection with this experiment was the apparently greater palatability of the fertilized plots. This was shown by the fact that the grass along the lane in the fertilized plots was kept closely grazed where the cows reached through the fence, while the grass in the check plot was almost untouched.

It is evident from these results and the results of experimental work in other States that pastures form one of the most valuable, as well as the cheapest, sources of feed for dairy cows or other livestock. Western Washington dairymen, with their mild climate and high yielding pastures, should be particularly interested in securing from these pastures the highest degree of productivity. This is best accomplished by the use of good land, good pasture grasses, intensive fertilization, supplementary irrigation when necessary, and careful grazing.

A City Man's Alfalfa

(*From page* 28)

use of lime, manure, fertilizer, and perspiration. No poorer piece of ground could be found to start alfalfa on than the one that Mr. Sellew picked out. It had several advantages, however. The land was so poor that there was no witch grass, and it was well drained.

Here is the procedure he followed to secure the stand, now four years old, of alfalfa which is as near 100 per cent perfect as could be asked for: 3½ tons of lime to the acre, 500 lbs. of 4-6-10, and 20 lbs. of alfalfa seed were put on in 1928. In the spring of 1929, when the alfalfa first started, he again applied 500 lbs. of 4-6-10 fertilizer to the acre and that fall another 100 lbs. In 1930 two excellent crops were cut. It was top-dressed with manure and superphosphate and 200 lbs. of 4-6-10 put on to the acre between the first and second cutting.

With all these applications a value over cost of $120 to the acre has been produced. "Nothing can live and do well without feed," says Mr. Sellew.

Cranberries

(*From page* 24)

the development of the canning of cranberries has also made it possible to have cranberries throughout the year. With the localized production of the cranberry together with the fact that the market lies almost wholly in the large population centers at some distance from the points of production, the marketing is an important problem. Organizations within the States, as well as for the country as a whole, have been developed to market the United States production, and in general it may be said that the marketing of the cranberry crop is done very efficiently and that the quality of the product is maintained at a high level by the organizations of the growers.

Potash Needs of Illinois "Alkali" Soils

(*From page* 20)

the crop producing capacity of the soils is attributed in part to the potassium it contains. In addition the crop is favored by a lowering of the nitrate nitrogen content resulting from the straw application.

"For the same reason, horse manure is most valuable on these soils, whereas cow manure is most valuable on soils in which a deficiency of available nitrogen is a limiting factor.

"A favorable physiological balance in the soil is desirable, particularly with respect to potassium and nitrate nitrogen."

Many of the experiments revealed that straw and potassium applications produced about equal results, combinations of the two, better results, and that potash drilled in with corn was extremely beneficial.

Marketing Quality Vegetables

(*From page* 11)

As growers, Reynolds and Moore are experts. Their produce is of the best quality and is produced for the demand of the market and season. Soil fertility is not only maintained but is built up by their system of crops of rye and vetch and the use of lime and fertilizer. Of the latter, purchases are made in car lots. For intensive cropping 1,500 pounds per acre of a 4-8-6 is the most common fertilizer rate and analysis with side-dressings of nitrate of soda as the crops require. For sweet corn, late tomatoes, and similar crops the rate used is 300 to 500 pounds per acre. Main season and late crops follow early vegetables on the same ground in the system these men follow, sometimes requiring a ton of fertilizer per acre per season.

Quality, care in seed trials, quick growth, intensive cropping, and fresh deliveries have maintained this business for more than 30 years on the same site, unusual in its location but comparable to similar businesses near much larger cities.

Seed Council Points Out the Value of Good Seed

By P. H. Stewart

Extension Agronomist, University of Nebraska

FOR some time the Seed Council of North America has been making a study of the weed problems of the United States. The increasing importance of weeds to American Agriculture has made this study an important undertaking.

Seedsmen complain that it is becoming more and more difficult to purchase lots of seed which are suitable for recleaning into high-class merchandise. This year, for instance, the prevalence of dodder and buckhorn in red clover is a very serious problem in many States.

Farmers likewise complain that new and often noxious weeds extremely hard to eradicate are getting a foothold on their farms, which makes it more difficult and expensive to raise a satisfactory crop and which in some cases may even lower land values greatly. The bindweed, for instance, in certain sections of the country has become so serious that farm loan companies will loan only one-half the usual rate on infested farms and in some cases they refuse to loan at all.

Who Is to Blame?

Just what is the solution to the weed problem, if there is one, and on whom does the responsibility for good seed rest? A recent study by the Seed Council of North America on State seed laws and their enforcement showed the surprising fact that very few States are actually enforcing their seed laws in a way that the public is protected when buying seed. Yet farmers in States with seed laws have the impression that since they have a law any lot of seed offered them is satisfactory.

Too much seed is sold on the basis of price with little attention paid to its quality, particularly to its freedom from serious weed pests. So-called "bargain lots" of seed are perhaps the worst offenders in this regard.

On the other hand, our good seedsmen often refuse to buy lots of seed badly infested with serious weed seeds. Such seed is consequently sold from farm to farm, thereby sowing down new seed producing fields which in turn produce undesirable seed crops.

Cooperation Is Needed

The responsibility of providing good seed does not rest with any single industry. Seedsmen point out that they themselves do not raise the seed which they sell, but must merchandise what is offered them. Farmers complain that some seedsmen sell foul lots of seed. The foundation for improvement in the production, sale, and use of good seed rests on the knowledge of what is good seed, an appreciation of its value, and the realization of the danger and folly of sowing seed which may contain serious weed pests, which once established take years to eradicate. The Seed Council, through its program, is attempting to help agriculture by working out a cooperative program involving farmers, seedsmen, seed law enforcement departments, the U. S. Department of Agriculture, and Colleges of Agriculture for combating weeds, and to assist in creating a more general sentiment for good seed.

The Inquiring Mind

(*From page* 16)

veals a surprising number and range of investigations, unequalled by any other similar institution in the United States. It is true that, owing to existing conditions, many of the experiments were necessarily incomplete; but, on the other hand, it will be noted that there has been a constant effort to remedy this defect, and, in consequence, the College may justly claim that in the unity, continuity and control of the principal investigations conducted here within the past decade or two she has no equal among similar institutions. It may also be noted that this College was one of the first to issue bulletins—as distinguished from the fuller reports—for free distribution, showing in brief the results obtained in the course of the experiment."

It is pleasing to note, in this early report, the pride Dr. Frear took in the Institution employing his services, and for which he worked so faithfully and well until 1922. His was a loyalty of purpose and practice which may, today, well be emulated by all the young research men of our agricultural experiment stations.

Remembered for Liming Work

C. A. Brown, Chief of the Bureau of Chemistry of the U. S. Department of Agriculture, said, in Prof. Mair's book: "In agricultural chemical research Dr. Frear will probably be longest remembered for his publications upon liming of soils, a subject in which he was interested during the whole of his career. His most conservative work, however, was unquestionably the pioneer service which he gave to the establishment of food standards and pure-food legislation. To this work he gave untiring energy, even after symptoms of his fatal illness were fastening upon him. In his devotion to high ideals and to public service in every worthy cause, the memory of Dr. Frear will be a constant inspiration to all who knew him, whether as a scientist, teacher, friend or citizen."

Professor Mairs has reported that when Dr. Frear arrived at the Pennsylvania State College, two years before the establishment of the Experiment Station, his previous work with the U. S. Department of Agriculture greatly assisted him in his new sphere of action. His broad general training and interest put him in contact easily with all departments of the College. The experiments which he had been conducting, and which were continued by him, established a continuity of activities in agricultural investigation on which the Experiment Station could be established more easily. Thus, there was no break or radical change of program, but rather a gradual mergence and expansion. His importance as a connecting link between the old and the new at that time is hard to estimate.

Gained National Recognition

Dr. Frear's ability and scholarship were recognized throughout the State and Nation. He was looked up to as an authority on all questions involving food chemistry, fertilizers, lime, and tobacco. As a chemist of the Dairy and Food Commission, he was most active in the framing of laws for the protection of the public. "Officials everywhere placed great reliance upon his knowledge of scientific matters, and the results of his investigations in field and laboratory. For these reasons his services were in constant demand in organizations not connected with the College."

Harry Hayward, another friend of Dr. Frear called him a "good mixer, with a sympathetic and pleasing personality; self-confident and self-reli-

ant; a willing and conscientious worker; a leading authority in the practical aspects of agricultural chemistry." His services as a speaker before chemical and agricultural meetings were in demand. He also took an active interest in local community affairs and did much to build up the village of State College. Among other things, he helped to promote and build the University Inn, was director of the first bank in State College, and helped to organize the first building and loan association, the State College Water Company, the Hillside Ice Company, the first electric light company, and aided in establishing a transportation company which materially improved the facilities for traveling to and from the College. While he would be considered a successful business man, he often seemed to have the welfare of the community as much in mind as his own financial interests.

Aside from his eminence as a scientist, Dr. Frear was admired for his many other good traits. Dean A. L. Watts said of him, in La Vie, of 1922, "His splendid Christian character and fine human qualities left an indelible impression upon the lives of all those who knew him, and upon thousands of people who counted him as a friend. His home life was beautiful, and he was most devoted to his wife and four children. He possessed to a remarkable degree the admirable qualities of kindness, cheerfulness, patience, and thoughtfulness. No one ever was associated with him in any capacity who was not helped in some way."

What more could be said to the credit of a man? Dr. Frear set an example few will be able perfectly to equal, but which all would do well to regard and follow.

Fertility and the Black Spot of Roses

(*From page* 17)

ly expressed opinions may be summed up in this way, "Keep the plants growing vigorously and steadily by the liberal use of fertilizers and copious watering." The grower of one of the largest rose houses said, "When black spot gets bad in any house I simply stop watering for a week or more. This usually makes the plants look worse with the disease but I syringe and knock off all the diseased leaves and then start the treatment. First I make a heavy application of cow manure with a sprinkling of superphosphate beneath it. Then the beds are watered heavily and in a short time the plants break into a heavy growth and the black spot will not appear on this new growth."

Keep the plants growing vigorously is the slogan and to do this they apply truly amazing amounts of fertilizer. A pound of fertilizer on each 20 square feet is over a ton to the acre, but when this amount is applied every three weeks to 25 days the amounts become astonishing. A commercial fertilizer is not always applied each time. In many cases they alternate this with heavy applications of cow manure. With this fertility goes extremely heavy watering at least once a week and sometimes more often.

The exact formulas used are rather variable. A 5-8-7 or a 4-12-6 are rather popular but in every case potash is included and they tend to the higher analyses of potash. One Ft. Wayne rose grower made the assertion that potash makes the rose stems stiffer and the flowers keep better. I know from personal observation that potash is quite essential on carnations to stiffen the stem. I have seen two greenhouses in the same locality, in-

deed, across the road from one another. In one where a fertilizer high in potash was used the sets of flowers and stiffness of stem was quite remarkable. In the neighboring house where such fertilizers were not used the stems were slender and were almost bent double with the weight of the flower.

Be the explanation what it may, I am not trying to recommend fertilizer practices for roses or carnations. I only know that these expert rose growers can demonstrate to anyone's satisfaction their ability to control the black spot disease.

Quite naturally their other cultural practices play an important part. Some growers make it a practice to remove all the fallen leaves from the beds after syringing. But, others simply cover them with the heavy mulch of cow manure. It seems to have the same effect.

Ventilation plays its important part also. These men say that they like to "carry a crack of air on the houses at all times" and when conditions are more favorable the ventilators are opened more fully. They often go to the expense of carrying heat in the house when the outdoor conditions would not seem to warrant it. Their idea is simply to be able to ventilate and dry out the air.

Dusting sulfur is the recommended specific against the black spot disease. Many growers have used this control with success as an added precaution against the disease. However, others are rather afraid to use this because they claim it may stain or burn the petals. I have had some very good and successful growers tell me that they are not interested in any dust or spray against this disease.

We should not gather from this that the use of sulfur dust against black spot is needless. It has been too often proven that this is not true, especially for the outdoor gardens. This statement merely reflects the faith these men have in properly feeding the plants to control the disease. And, we cannot disregard their opinions because they are based on actual experiences that have proven commercially successful.

The slogan of these rose growers, "Plenty of feed and plenty of water to make the plants grow vigorously will hold the black spot in check" needs careful consideration. This should be a subject of research to determine why these men are right.

The Toxicity of Certain Fertilizers

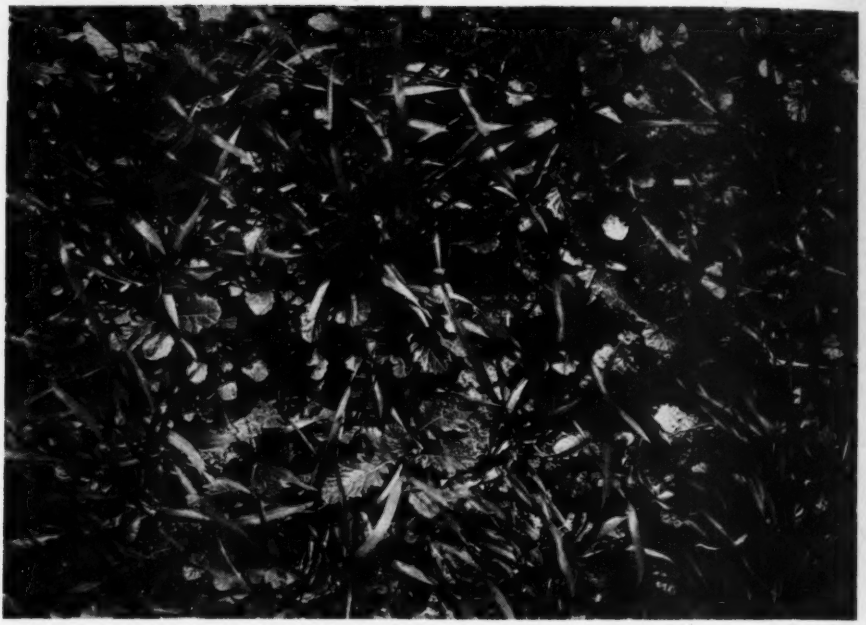
(*From page* 42)

a fertilizing material. The idea is to obtain first a selective destructive action, immediately followed by a fertilizing action favorable to the species spared.

The main features of toxicity being known, it becomes possible not only to avoid its bad effects, but even to take advantage of them. Toxic effects can be used against parasites of all kinds, bacterial, vegetal, or animal.

It must be observed that for a long time industries based on bacterial actions have known how to use the effect of such compounds as fluorides (in distillery) or sulphurous acid (in winery) to provoke the selective action used in the fermentation.

In some cases it is desired to permanently check spontaneous plant growth, as in the case of park and garden avenues and pathways. The proper use of chemical compounds saves labor and keeps such places clean for several months without any need



This close-up shows a thick infestation of charlock in a field in Alsace before an application of finely ground kainit.

of raking. For such purposes, the materials used are either highly and permanently toxic ones, like chlorates, or slightly toxic but cheap ones, like waste sodium chloride and calcium chloride. Such applications, however, are used not so much in agriculture proper as in cities and industrial areas.

New Results Obtained

We have already indicated an agricultural application, the selective action of some chemical treatments destroying weeds in grain, beets, potatoes. Lime nitrogen is ordinarily used more than a month before planting time, mainly to avoid its possible toxic effect at planting time, but also to obtain a partial sterilization and cleaning of the soil before it acts as a fertilizer.

A good farmer of the Somme told us that he had obtained a very good and clean stand of flax on land infested with buttercups by applying the necessary nitrogen as lime nitrogen only ten days before sowing, adding that he knew very well that such an application would have been very dangerous if he had been sowing wheat instead of flax. The generalization of such a practice cannot yet be advocated owing to considerable differences in the analysis of two samples of lime nitrogen, even with the same nitrogen content. However, the experiment is worthy of note and certainly deserves further investigation.

Mr. Lévêque, Director of Agricultural Services for the Sarthe, applied 1,800 lbs. of lime nitrogen per acre, thus destroying wild oats and twitch grass in land that four months later had gone back to a satisfactory state of fertility.

In the North of France the use of heavy kainit dressings on loess soils immediately after the harvest helps to clean the soil and also avoids any bad physical effect of the fertilizer on the soil if the kainit was used after ploughing only.

Reports recently received confirm the possibility of destroying dodder by heavy local applications; a few months later alfalfa enjoys the double advantage of the cleansing and fertilization.

A picture of the same field shortly after an application of kainit shows the charlock leaves curled and dying.

Heavy applications of kainit prevent June-bug grubs from damaging pastures. Wire worms also are affected by such applications.

Although the details of the treatment are not determined, heavily concentrated solutions of kainit applied in winter to the bark of fruit trees help in fighting parasites and disease germs.

In the last given examples, the toxicity of concentrated solutions is eliminated by simple dilution. It is not an impossibility to foresee the development of agricultural practices based on a temporary toxicity automatically followed by the fertilizing action of the material used.

Besides such obvious actions, there is also a certain partial sterilization modifying the microorganic population of the soil. Instead of obtaining this modification by the use of antiseptic products properly speaking, would it not be better to obtain it through a side action of fertilizers?

The results obtained are very encouraging and permit hopes for a solution of a problem recently set by Mr. Schribaux, to wit, the chemical cleaning of summer fallows. It is only necessary to obtain at a reasonable price products highly but temporarily toxic eventually decomposing into fertilizing materials.

Progress Still to Be Made

The increase in the cost of labor and the impossibility for machinery to do a perfect cleaning job, even in the case of crops planted in rows, give this problem an economic aspect. The possibility of killing two birds with one stone, in other words, of cleaning and fertilizing at the same time, is important.

To develop the selective action of which we spoke in connection with soils and finely ground materials, it is necessary to have numerous observations classifying plants according to their relative resistance in given biological and meteorological conditions. The practical limit between affected and spared plants can probably be changed not only through varying concentrations but also through a

modification of the surface tension of the solutions used.

Summary

It is a well-known fact that certain fertilizing materials have a more or less marked toxic effect at the time of application. In some cases this action is detrimental, but it is also possible to take advantage of it.

Toxicity can be permanent or temporary. In the latter case the toxic action may be followed by a fertilizing action.

The possibility of destroying certain species and developing other species growing together has already been used to a large extent.

Economic results are obtained particularly with lime nitrogen and potash salts which clean the land and fertilize it at the same time.

Winter Weed Hosts

(*From page* 27)

made in the fall. With the rush of spring and summer work farmers in many cases have a good excuse for not keeping all weeds under control. When the rush work is over, a few days spent in cleaning up weeds on the farm may prove exceedingly valuable and be a step towards the ideal crop conditions for which we should always strive.

Cultivation of fields to induce the germination of weed seeds, clipping, digging, spraying, and burning of weeds now will not only reduce the weed stand for the coming season but will destroy the winter sanctuaries of many profit-eating pests.

A Fallacy Uncovered

(*From page* 13)

ing of this year's wheat crop last October. For fertilizer he renewed his application of 10-0-4, and added to each acre 700 pounds of ground rock phosphate.

The result was the fruition of his six years of planning. He was not greatly surprised, but his neighbors were. His yield was 50 bushels an acre.

His belief was that while potash may be present in abundant quantity in red clay lands, in many instances certainly it is not in a form available to crops planted on that land. Pending the time when some one discovers a means of liberating that store of potash inherent in the soil, he is now assured that many farmers will find it profitable to add a sufficient supply of potash to meet the needs of their growing crops.

Another one of our Mecklenburg county farmers suspected that his wheat was suffering from a want of potash. When several years ago he bought the farm, he was disappointed with its infertility. He knew the soil was poor, but he was amazed when the field peas he sowed attained only a maximum height of six inches.

For three years in succession he planted lespedeza and turned that crop under in an effort to build up the soil. That his efforts were in the right direction came to light the next year when he planted cotton. He limed his soil and put on 800 pounds of 10-4-4 fertilizer to the acre. By this time the soil was showing signs of fertility, but

even he was surprised when it produced a bale of lint cotton to the acre. That is a very good yield of cotton under the best of conditions in this territory.

In the fall of 1930 he decided to plant wheat on a 3½-acre strip of that farm. He put in 200 pounds of superphosphate to the acre of 40 pounds of muriate of potash. This spring he applied 75 pounds of nitrate of soda an acre.

While the average wheat yield this year in this section was below 20 bushels an acre, he made 42 bushels an acre on his well-prepared, well-fertilized wheat field.

Barkers and Builders

(*From page* 4)

enjoyable for us to be swindled, let's throw everything else aside and make a pastime of it. Hence we tolerated an army of porch-climbers such as no nation ever before assembled and endured, and we thought we had to treat them freely after each raucous serenade.

Sometimes America reminds me of one of those boom-town real estate projects with which we are familiar. When times were kiting and suckers were biting, the boomers sent a steam calliope all over town, hung flags and signs all over the lot, held hot auctions, grabbed any kind of collateral, and pocketed the profits. But as for real preparedness and constructive planning, sanitation and building restrictions, why they weren't part of the glowing idea at all. Leave *that* to the quiet and unobtrusive fellows who held the deeds. Let *them* arrange transportation, drainage, and mosquito eradication. Sales resistance, not stability, was the objective for which the salesmen were trained.

Of late the mental muscles of the professional rapid-fire salesman have been fatigued unwontedly by meeting a unique kind of sales resistance. It was just a game and a mighty sport for the go-getter gods to break down this S. R. bogy before the recent period of unpleasantness. If you couldn't sell a fellow a harmonica, maybe you could sell him a saxophone. It was only a relative thing. If he wouldn't bite on worms, try a casting fly.

However, since folks have sort of sobered down, there is something besides sales resistance and stubborn opinion to consider. Now it is the fundamental, the wear-ever, the lasting and the sincere and truthful appeal. When selling things now, it is not effective to talk out of the wry corner of the mouth or to slap people on the backs, or take them over where the suds is sloshing on the sly. Expense accounts may go up a little on the mileage between customers, but the inexplicable and mysterious "overhead" for prostituted good-will is getting less of a burden in red ink for the good old firm. The froth is blown off, the big wind is becalmed, the air is clear, and maybe the tired world is waiting for the sunrise without fear of a headache.

One of my good friends, who has suffered with the rest of us from being regarded as just so much clay to be molded, turns to me and asks, "Need we pay more for things and services because they are cellophane wrapped?" He has bought six bunches of radishes for ten cents that cost six cents to raise, and they were not wrapped in cellophane. At another counter he purchased 15 cents worth of fags that cost two cents to produce, and 25 cents worth of chewy candy that cost five cents to make, and behold they were wrapped

in the scintillating tissue that keeps out all foreign flavors and delights the eye. He goes to a dentist and a lawyer and finds them also wrapped in cellophane. So he quietly goes to his home, attaches a string from his molar to the door-knob and reaches for his Handy Home Attorney booklet. After he shuts the door and shuts the book, his problems will be solved without paying tribute to the flare in commercialism. The only alternative for this independent way out is to search long and patiently for professional men who do not value their worth on false or intrinsic standards.

I ATTENDED the funeral last month of one of the world's most successful salesmen, if you would include in that list a man who revolutionized an entire industry's business system. He lived in a quiet house on a shady street, wanted no monuments and shunned all pageantry, cultivated a few friends and some hollyhocks, and passed away with all the public honors a State and Nation could bestow. This was my friend, Dr. S. M. Babcock. Without ever writing a single line about his great invention, without publishing a catalog or brandishing a sales talk to bust somebody's resistance, Dr. Babcock lived to see his test used around the world and his original ideas soundly verified. If he had the human urge for self-expression, he achieved it without help of radio or raucous campaigning. And what is better still, after achieving a world-wide voice, the echo of it will reverberate long after the cat-calls of the lesser species are forgotten.

Do not confuse my suggestion here with the worn-out adage about the man who invented a mouse-trap and the beaten path to the wilderness, etc. There is a great distinction between a hermitage and a home of humility. There is a difference between a crass go-getter and a simple man who has the goods.

Competition probably caused a great amount of salve and gusto in the methods of selling. We must honestly recognize this in order to make some excuse for the schools of thought that were trained in the past decade to plunder and pluck the unwary. Many a salesman started out on his morning grind with a bad taste in his mouth acquired the day before. It wasn't his fault that the morsel he chewed was unsavory, for the family had to live and he was the provider.

But there is ample room for clean competition and of a kind that is based on something besides splurge. This is the sort of competition which the public may soon welcome as an antidote for previous poison.

ONE of my unhappiest recollections is a visit paid to a national sales convention done up in feverish style by one of the largest mechanical concerns in America. Everybody was tagged with the dollar sign. The overture was played by a mighty orchestra at the public's expense, the silken curtain parted so that we of the pit might see the vision behind it. Seated in a gaudy row on imitation gilded thrones along the footlight margin were a dozen pompous fellows from the back-country, men who were rated among the best sellers in the sticks.

Up rose the major-domo of the panorama of progress. He bore to the front a dozen bags of gold coins, bowed low before the court of commerce, and presented these tokens of hustle to the twelve apostles of gas and gall. I gritted my bicuspids and almost swallowed my cud. For right there in the line sat our local behemoth, the fellow who sold more machines and caused more dissatisfaction in his wake than any peddler known to the constables. I had more personal complaints about his work and more cussing of his company through him than any man I knew. Yet here he was, the pride of the clan!

I wonder which party sinned the more against the other, the manufacturing company that exerted every in-

fluence to speed its gross sales under any terms, or the district manager who misrepresented goods and blackened what merit the product had by disregard of complaints. It may be added that in two years after this incident the "crown prince" of the dollar drama got his walking papers from the same concern that coronated him. He simply couldn't find any more suckers. It's a feast or a famine with the rabid boys. But the system that made them racketeers is due sooner or later for an overhauling.

AFTER I graduated from high school numerous years ago, a job opened for me in the local Palladium of liberty, consisting mostly for six months of sweeping up copy and cigar butts and dodging the "type lice" used to initiate the typographical tyro. In due time I was promoted to the case and allowed to "throw in" the hand-set rows of type taken from broken and dead job forms. The printers who composed the type in sticks for the forms were repaid on the positive basis, while those who merely distributed it got the negative end of the wage scale. One element represented the quick and the other represented the dead. The former were catered to by the boss, while the latter were just tolerated as unavoidable appendages.

Later when entering the sanctum as a scribe I tasted fleeting visions of glory. Finally I learned that in the front office there was also some real class distinction. The chaps who negotiated the paid advertising were regarded as supporters of the whole journalistic clan, while the fellows who wrote stuff for the spaces left after the advertising was inserted were similar to the type tossers of the rear room. They merely had to be tolerated because few people would subscribe to a sheet consisting only of paid insertions.

With some few exceptions this line of sub-conscious demarcation seems to exist between the copy men and the contact live-wires in a majority of publications. Unless a writer is shrewd enough to blast himself a niche in some syndicated commercialized series, he must content himself to be the clown of the parade while the advertising galaxy ride in the band wagon behind the ring-master. Lest somebody suspect a touch of malignity in this, I hasten to say vehemently that there are plenty of compensations coming to the one who writes chatter instead of checks. And there are here and elsewhere many publications that "sell" their editorial power and defend it in a highly intelligent and courageous way. In such association of mutual interest it has been a privilege to serve, and the success of such

periodicals presages the advent of more.

In this aspect it must not be forgotten that to some degree the publishers have been as helpless to remedy conditions as the disgusted salesmen were under the lash of financial furies. It was all part of the old side-show aforementioned. Graft and the world grafts with you, be square and you won't get a loan.

WITH humanity molded as it is, no doubt for some time there will be required many arts of promotion before confidence is acquired through public experience. Promoters are needful to demonstrate virtues and values and instill normal desires. Nothing will entirely sell itself. Even a meal of victuals is often preceded by aromas arising from the lifting of pots and stew-pan lids, through which the gastric nerves get their hunch that all is well with the menu.

But when our investments are made on the midway at the call of the barker instead of being placed in some relatively slow but substantial venture, we emerge with neither cash nor confidence.

"Caveat emptor," let the buyer be Scotch, has slowed up purchases and dulled the market. In the meantime things are wearing out and getting old-fashioned. In due time a resumption of trade will mend matters, whereupon we are to decide whether to buy by bywords or to be customers on confidence.

This will not be an easy decision to make owing to the fact that our herd is corralled in a country of rustlers, where a stampede is always imminent regardless of the plentiful pastures where we are grazing.

But they remind us that the trail behind is closed and it is un-American to turn back after we have the herd started straight for market. Old simplicities of life lie under moss-grown tombstones. The State motto is "Forward." The youngsters are trotting on our heels, pressing us ahead, sometimes outrunning our spavined hoofs. We might just as well be prepared to go on full rations as before, and get our dressing percentage up so that the packers will welcome us at the abattoir.

Pause as we may to spend a little philosophy in lieu of cash on the economic environment, most of us realize how futile it all becomes. Goods made to sell and desires tuned to respond have become habits with us. Even the stuff I purvey might be dispensed with. But variety, vim, novelty, excitement, newness, sugar-coated with slogans and color, combine to make it tough sledding for the fundamentals. In fact, I sometimes doubt if we have any fundamentals left in stock to show you, mister! And maybe you wouldn't know how to use a fundamental if you had one, saith the salesman.

Yet as I said before, a few of us cling to our antiques. They possess no current market values perchance, but there is a kind of restraining rebuke in their solidity and simplicity which may be a talisman to ward off another attack of the "got-to-get-ems."

The "gimmes" and the "got-to-get-ems" will persist as trade-marks of American progress, prosperity, and achievement. If they are incurable maladies and not malignant, we must be prepared to live with them. Let us resolve to patronize practitioners who prescribe carefully rather than to dose our systems with the nostrums of the barker.

ERE long we shall again be swimming in the same old pool of optimism, from which the septic taint of pessimism has been distilled. Dancing along the spring-board in the latest sun-tan suits, with never a cloud on the horizon, we throw all caution to the winds and leap off the end in a frenzy of foam. Back again in our natural element with the fish, ready to rise to the bait and swallow the spoon.

CLINGING VINES

Mother (to little daughter returning from Sunday school): "Well, what was your lesson about this morning?"

Little Daughter: "A man named Solomon."

Mother: "And what did you learn about Solomon?"

Little Daughter: "The teacher said he had 300 wives and 700 cucumber vines."—*Textileathergram.*

"Oh, would I were a bird," she sang,
And each disgusted one
Who listened, to himself did say—
"Oh, would I were a gun!"

GRANNY WAS WISE

The girl friend collects antiques, and recently she acquired a horsehair chair, whereupon she discovered immediately why grandmother always wore six petticoats.

Grocer Jim—My wife explored my pockets last night.

Friend Tom—What did she get?

Grocer Jim—About the same as any other explorer—enough material for a lecture.

MATCHED

The teacher was testing the knowledge of the kindergarten class. Slapping a half dollar on the desk, she said sharply, "What is that?" Instantly, a voice from the back row said, "Tails."

PLEASE REPORT

When the colored couple were being married by the clergyman and the words, "Love, honor, and obey" were spoken, the bridegroom interrupted:

"Read that again, suh. Read it once mo' so's de lady kin ketch de full solemnity ob de meanin'. I'se been married befoh."—*Exchange.*

Mistress (who had sent Swedish maid to the theater): "Why, Olga, you're back early—it's only 10 o'clock. Wasn't the show good?"

Olga: "It was all right."

Mistress: "But why didn't you stay for the last act?"

Olga: "What for? The program said, 'Act III same as Act I.' "

Lawyer: "Can you tell me if the defendant was expensively garbed?"

Negro Witness: "Deed she was, sah. Ah knows expensive garbage when ah sees it."—*Tit-Bits* (*London*)

Very few big jobs are held by men who honk and honk in a traffic jam.—*The Atlantic Log.*

EXPLAINED

"You say that you have driven a car for ten years and never had a backseat driver?" inquired the weak-chinned gentleman.

"Yeah," asserted the sad-faced man. "I drive a hearse."

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